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New Orleans District**

**MARINE REMOTE SENSING SURVEY OF THE
ATCHAFALAYA OCEAN DREDGED MATERIAL
DISPOSAL SITE, LOUISIANA**

October 1998

FINAL REPORT

**R. Christopher Goodwin & Associates, Inc.
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New Orleans, LA 70123**

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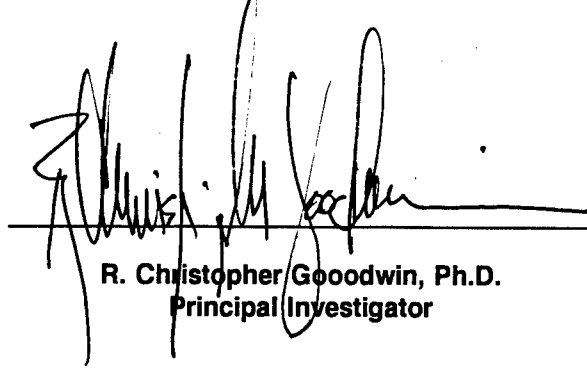
**U.S. Army Corps of Engineers
New Orleans District
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ATCHAFALAYA OCEAN DREDGED MATERIAL DISPOSAL SITE,
LOUISIANA**

FINAL REPORT



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New Orleans, LA 70123**

September 1998

for

**U.S. Army Corps of Engineers
New Orleans District
P.O. Box 60627
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19. ABSTRACT (Continue on reverse if necessary and identify by block number) This report presents the results of Phase I archival and archeological investigations of an approximately 9.65 sq mi (26.4 sq km) area along the east side of the Atchafalaya River Bar Channel, in coastal Louisiana, between Terrebonne and St. Mary Parishes. These investigations were undertaken by R. Christopher Goodwin & Associates, Inc., on behalf of the U.S. Army of Corps of Engineers, New Orleans District, in support of the proposed establishment of an Ocean Dredged Material Disposal Site (ODMDS). In keeping with the U.S. Army Corps of Engineer's mission to inventory, document, preserve, and protect significant cultural resources under their stewardship, this study will assist the New Orleans District to comply with Section 106 of the National Historic Preservation Act of 1966, as amended; the Advisory Council on Historic Preservation's regulation 36 CFR 800, "Protection of Historic Properties"; the Abandoned Shipwreck Act of 1987 (43 U.S.C. 2101-2106); the Secretary of Interior's Standards and Guidelines for Archeology and Historic Preservation (Federal Register 48, No. 190, 1983), and Abandoned Shipwreck Act Guidelines; Louisiana's Comprehensive Archeological Plan (1983); and the Louisiana Submerged Cultural Resources Management Plan (1990). (continued on page ii)			
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The objectives of this study were: (1) to identify specific targets or clusters of targets within the project area that represent potentially significant submerged cultural resources; and (2) to provide the New Orleans District with management recommendations concerning those resources. These objectives were met through a combination of archival and archeological investigations. Background archival research assessed the potential for significant archeological resources within the project area and provided a site-specific context for the area. Archeological investigations consisted of a controlled remote sensing marine archeological survey of a total of 6,176 acres of ocean bottom. The survey employed a differential global positioning system (DGPS), a digital-output marine proton precession magnetometer, a digital-imaging side scan sonar, and a precision digital-output fathometer, interfaced with a computer utilizing hydrographic surveying software to record incoming data streams in real time.

A total of 1,000 magnetic anomalies, 165 acoustic anomalies, and 119 bathymetric anomalies were recorded as a result of the initial survey, and a sample of 17 potentially significant areas were identified for more intensive survey. This more refined survey resulted in the delineation of a further 307 magnetic anomalies, 13 acoustic targets and 24 bathymetric anomalies. These anomalies and clusters of anomalies were rated according to their potential for representing cultural resources. Although significant submerged cultural resources may lie within the project area, survey results indicate that they are deeply buried beneath sediments that have accumulated during the historic period. Based on the geophysical data and the geomorphology of the project area, the establishment of the Atchafalaya ODMDS and disposal of dredged materials will simply add to the historic sedimentation and have no significant impact upon any extant resources. As a result, **no further archeological investigations are warranted or recommended for the study area for the proposed undertaking.**

TABLE OF CONTENTS

REPORT DOCUMENTATION PAGE	i
LIST OF FIGURES	vi
LIST OF TABLES	viii
I. INTRODUCTION	1
Project Location and Description	1
Research Objectives and Design	1
Organization of the Report	4
II. NATURAL AND CULTURAL SETTING	5
Natural Setting	5
Geomorphic Context	5
Historical Setting	7
Cultural Units and Themes	7
Prehistoric Overview	8
Historic Overview	8
Historic Context	8
Exploration and Colonization	9
Antebellum Period	9
Civil War and Aftermath	10
Industrialization and Modernization	10
Shipwreck Potential	11
Vessel Types	11
Traffic Routes	12
Currents, Winds, and Other Natural Hazards	12
Preservation Conditions	13
III. RESEARCH METHODS	15
Archival Investigations	15
Archeological Field Investigations	15
Survey Design	15
Overview of Instrumentation	16
Positioning	16
Coordinate Reporting	17
Magnetometry	18
Acoustic Imaging	20
Bathymetry	20
Logistics	22
Remote Sensing Data Analysis	23
Analysis and Identification of Potentially Significant Targets	23
Magnetic Data	23
Contouring of Magnetic Data	25
Anomaly Clusters	26
Acoustic Anomalies	26
Bathymetric Data	26
Assessment Archeological Potential	27

Delineation of Areas for Resurvey	28
IV. RESULTS OF INVESTIGATIONS	29
Archival Results	29
Historical Research	29
Previous Investigations	29
Archeological Results	30
General Overview of the Initial Survey Results	30
Magnetic Anomalies	30
Acoustic Anomalies	36
Bathymetric Anomalies	36
Anomaly Numbering System	36
Results of Block 1 Initial Survey Data Analysis	37
Cluster 1-1	37
Cluster 1-2	37
Miscellaneous Identified Targets	37
Results of Block 2 Initial Survey Data Analysis	44
Cluster 2-1	44
Cluster 2-2	44
Cluster 2-3	44
Cluster 2-4	44
Cluster 2-5	52
Cluster 2-6	52
Miscellaneous Identified Targets	52
Results of Block 3 Initial Survey Data Analysis	52
Cluster 3-1	52
Cluster 3-2	52
Cluster 3-3	57
Cluster 3-4	57
Cluster 3-5	57
Cluster 3-6	57
Cluster 3-7	58
Cluster 3-8	58
Cluster 3-9	58
Cluster 3-10	58
Cluster 3-11	58
Cluster 3-12	59
Cluster 3-13	59
Results of Block 4 Initial Survey Data Analysis	59
Cluster 4-1	59
Cluster 4-2	59
Cluster 4-3	64
Cluster 4-4	64
Cluster 4-5	64
Cluster 4-6	64
Cluster 4-7	64
Cluster 4-8	65
Cluster 4-9	65
Other Anomalies	65
Results of Block 5 Initial Survey Data Analysis	65
Cluster 5-1	65
Cluster 5-2	65
Cluster 5-3	70

Cluster 5-4	70
Cluster 5-5	70
Cluster 5-6	70
Cluster 5-7	70
Cluster 5-8	71
Results from the Detailed Re-survey of Selected Anomalies	71
Results of Block 1 Resurvey Data Analysis	73
Resurvey Area 1A	73
Resurvey Area 1B	73
Resurvey Area 1C	73
Results of Block 2 Resurvey Data Analysis	73
Resurvey Area 2A	73
Resurvey Area 2B	73
Resurvey Area 2C	73
Resurvey Area 2D	74
Results of Block 3 Resurvey Areas Data Analysis	74
Resurvey Area 3A	74
Resurvey Area 3B	74
Resurvey Area 3C	74
Resurvey Area 3D	74
Resurvey Area 4A	75
Resurvey Area 4B	75
Resurvey Area 5A	75
Resurvey Area 5B	75
Resurvey Area 5C	75
Resurvey Area 5D	75
Resurvey Area 5E	76
 V. SUMMARY AND CONCLUSIONS	 77
Summary	77
Methods	77
Survey Results	77
Conclusions and Recommendations	80
 REFERENCES	 83
 ACKNOWLEDGEMENTS	 88
 APPENDIX I - PROJECT SCOPE OF WORK	
APPENDIX II - INVENTORIES OF ACOUSTIC ANOMALIES DISCOVERED IN INITIAL SURVEY	
APPENDIX III - INVENTORIES OF BATHYMETRIC ANOMALIES DISCOVERED IN INITIAL SURVEY	
APPENDIX IV - INVENTORIES OF MAGNETIC ANOMALIES DISCOVERED IN INITIAL SURVEY	
APPENDIX V - INVENTORIES OF ACOUSTIC ANOMALIES DISCOVERED IN THE RESURVEYED AREAS	
APPENDIX VI - INVENTORIES OF BATHYMETRIC ANOMALIES DISCOVERED IN THE RESURVEYED AREAS	
APPENDIX VII - INVENTORIES OF MAGNETIC ANOMALIES DISCOVERED IN THE RESURVEYED AREAS	
APPENDIX VIII - RESUMES OF KEY PROJECT PERSONNEL	

LIST OF FIGURES

Figure 1.	General location of the project area	2
Figure 2.	Atchafalaya ODMS project area, showing marine archeological survey blocks	3
Figure 3.	Imagenex 858 side scan sonar image of a submerged boat (courtesy of Imagenex)	21
Figure 4.	Screen from <i>Hypack's</i> "Edit" program, showing course track (top graph), magnetometer profile (lower graph), and tabular data (at bottom of image)	24
Figure 5.	Magnetic anomalies located in Block 1	31
Figure 6.	Magnetic anomalies located in Block 2	32
Figure 7.	Magnetic anomalies located in Block 3	33
Figure 8.	Magnetic anomalies located in Block 4	34
Figure 9.	Magnetic anomalies located in Block 5	35
Figure 10.	Center points of magnetic anomalies, Block 1	40
Figure 11.	Contour map of magnetic anomaly gradients, Block 1	41
Figure 12.	Bathymetry in Block 1	42
Figure 13.	Anomaly clusters, Block 1	43
Figure 14.	Sonar anomaly A37 at center left of screen; magnified x3 to right. Trawl scar across the lower part of the image	45
Figure 15.	Sonar anomaly A42	46
Figure 16.	Center points of magnetic anomalies, Block 2	47
Figure 17.	Contour map of magnetic anomaly gradients, Block 2	48
Figure 18.	Bathymetry in Block 2	49
Figure 19.	Anomaly clusters, Block 2	50
Figure 20.	Sonar targets A77-80, visible as wide, oval shaped returns, mixed with small hard returns which show up as white spots	51
Figure 21.	Center points of magnetic anomalies, Block 3	53

Figure 22. Contour map of magnetic anomaly gradients, Block 3	54
Figure 23. Bathymetry in Block 3	55
Figure 24. Anomaly clusters, Block 3	56
Figure 25. Center points of magnetic anomalies, Block 4	60
Figure 26. Contour map of magnetic anomaly gradients, Block 4	61
Figure 27. Bathymetry in Block 4	62
Figure 28. Anomaly clusters, Block 4	63
Figure 29. Center points of magnetic anomalies, Block 5	66
Figure 30. Contour map of magnetic anomaly gradients, Block 5	67
Figure 31. Bathymetry in Block 5	68
Figure 32. Anomaly clusters, Block 5	69

LIST OF TABLES

Table 1.	Clusters with component anomalies and assessment of potential for containing cultural resources	38
Table 2.	Location and size of resurvey blocks (XY coordinates at center point of block)(Louisiana State Plane [South] Coordinates in Ft [NAD-27])	72
Table 3.	Comparison of the number of anomalies found in 50 (15.24 m) ft lane survey of resurvey blocks with the number of anomalies found at 160 ft (48.78 m) lane spacing	79
Table 4.	Assessment of cultural resource potential of resurvey blocks	81

CHAPTER I

INTRODUCTION

Project Location and Description

This report presents the results of a Phase I remote sensing submerged cultural resource investigation undertaken by R. Christopher Goodwin & Associates, Inc., from June to August of 1996, on behalf of the U.S. Army Corps of Engineers, New Orleans District (USACE-NOD). The study was prepared in support of the proposed establishment of an Ocean Dredged Material Disposal Site (ODMDS) on the east side of the Atchafalaya River Bar Channel, in coastal Louisiana, between Terrebonne and St. Mary Parishes (Figures 1 and 2). The Atchafalaya ODMDS project site encompasses an area measuring 0.5 mi (0.85 km) wide x 19.3 mi (31.06) long. Water depths in the project area range from 6.0 to 23.0 ft (1.8 to 7.0 m) at mean lower low water and average approximately 16.0 ft (4.9 m), according to nautical charts of the vicinity (NOAA Chart 11351 *Point au Fer to Marsh Island* [rev. ed. 1991]).

In keeping with the Corps of Engineers' mission to preserve, document, and protect significant cultural resources, archival research and a magnetic and acoustic remote sensing survey were undertaken by Goodwin & Associates, Inc. to locate and identify potentially significant cultural resources within the project area that may be affected adversely by the proposed disposal of dredged material in the Atchafalaya River Bar Channel ODMDS. All phases of these investigations were completed in full accordance with the project Scope of Work; the National Historic Preservation Act of 1966, as amended; the Advisory Council on Historic Preservation's regulation 36 CFR 800, "Protection of Historic Properties"; the Abandoned Shipwreck Act of 1987 (43 U.S.C. 2101-2106); the Secretary of Interior's Standards and Guidelines for Archeology and Historic Preservation (Federal Register 48, No. 190, 1983), and Abandoned Shipwreck Act Guidelines; National Register Bulletin 15, "How to Apply the National Register Criteria for Evaluation" (rev. ed. 1991); Louisiana's Comprehensive Archeological Plan (1983); and the Louisiana Submerged Cultural Resources Management Plan (1990).

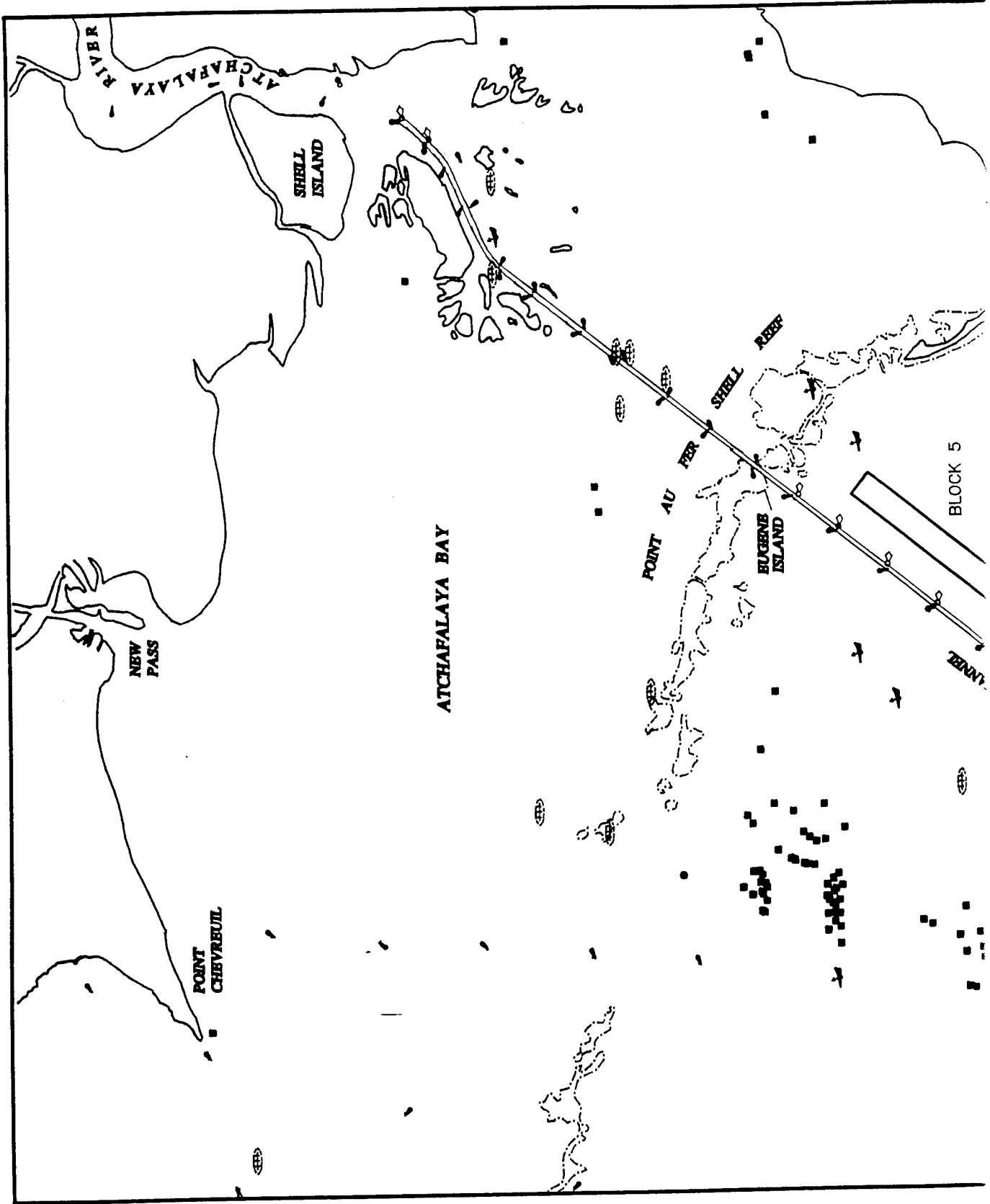
Research Objectives and Design

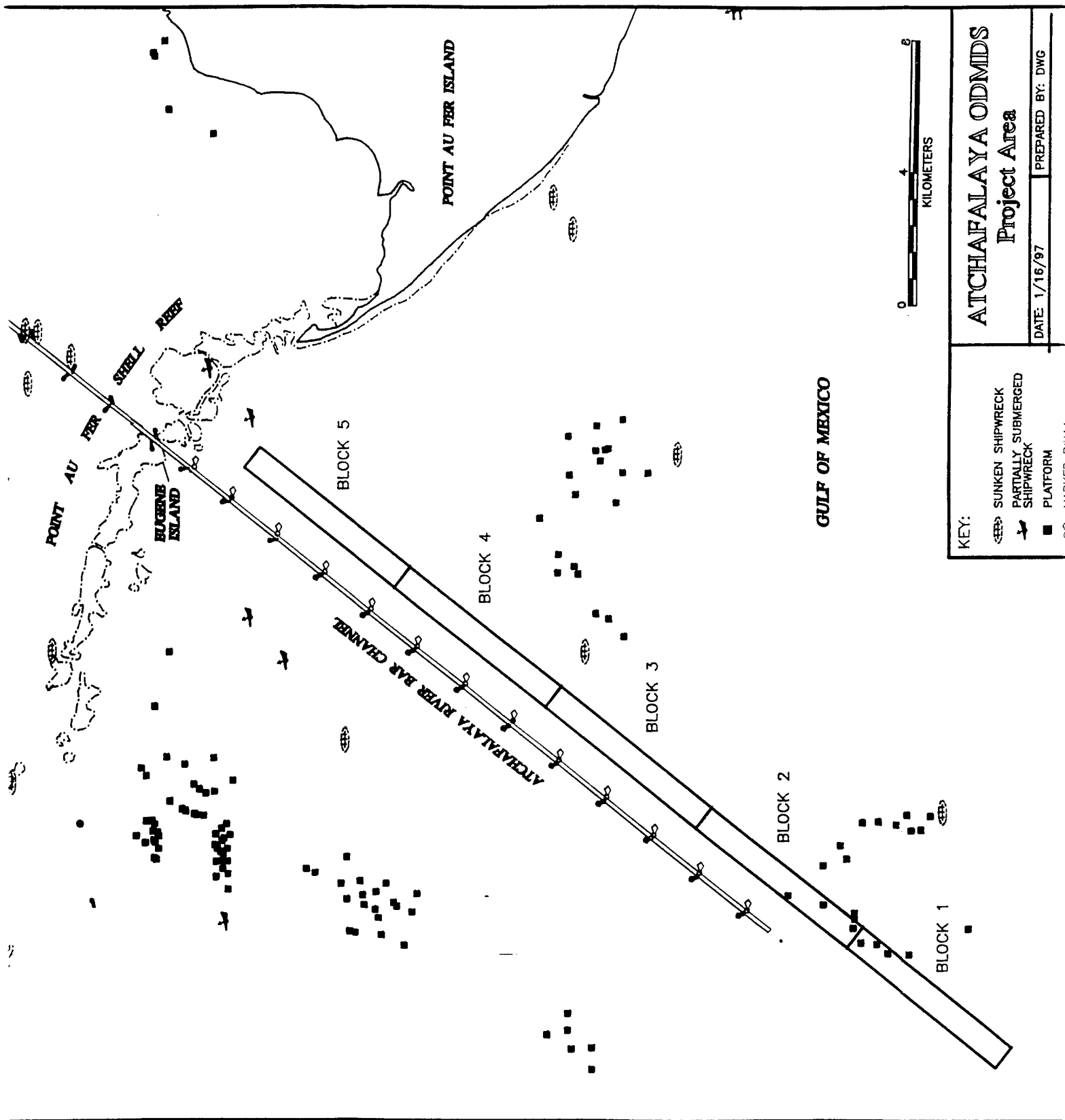
The primary objectives of these investigations were to locate and identify specific features or clusters of features within the project area that might represent potentially significant submerged cultural resources and to assess how these resources might be affected by the proposed deposition of dredged materials over them. The USACE-NOD recognizes that deposition of dredged materials might result in the deformation or breakage of the hull structure of intact sunken vessels from the increased weight of additional overburden. Deposition might also disturb environmental conditions, raising the possibility of accelerated degradation of hull components and artifacts. The study's secondary objectives included the development of a brief overview of the cultural and geomorphological contexts of the project area, paying particular attention to issues relating to ship wreck deposition, dispersion, and preservation, and documenting changes that have occurred to the Atchafalaya River Bar Channel over time.

These objectives were met through a combination of archival and archeological research. Background archival investigations were conducted to determine the area's archeological potential and to create a site-specific context for it. Archival documents and results from previous investigations were reviewed to establish a chronological sequence of shoreline changes and to



Figure 1. General location of the project area





ATCHAFALAYA ODMDS Project Area

DATE: 1/16/97
PREPARED BY: DWG

KEY:

- SUNKEN SHIPWRECK
- PARTIALLY SUBMERGED SHIPWRECK
- PLATFORM

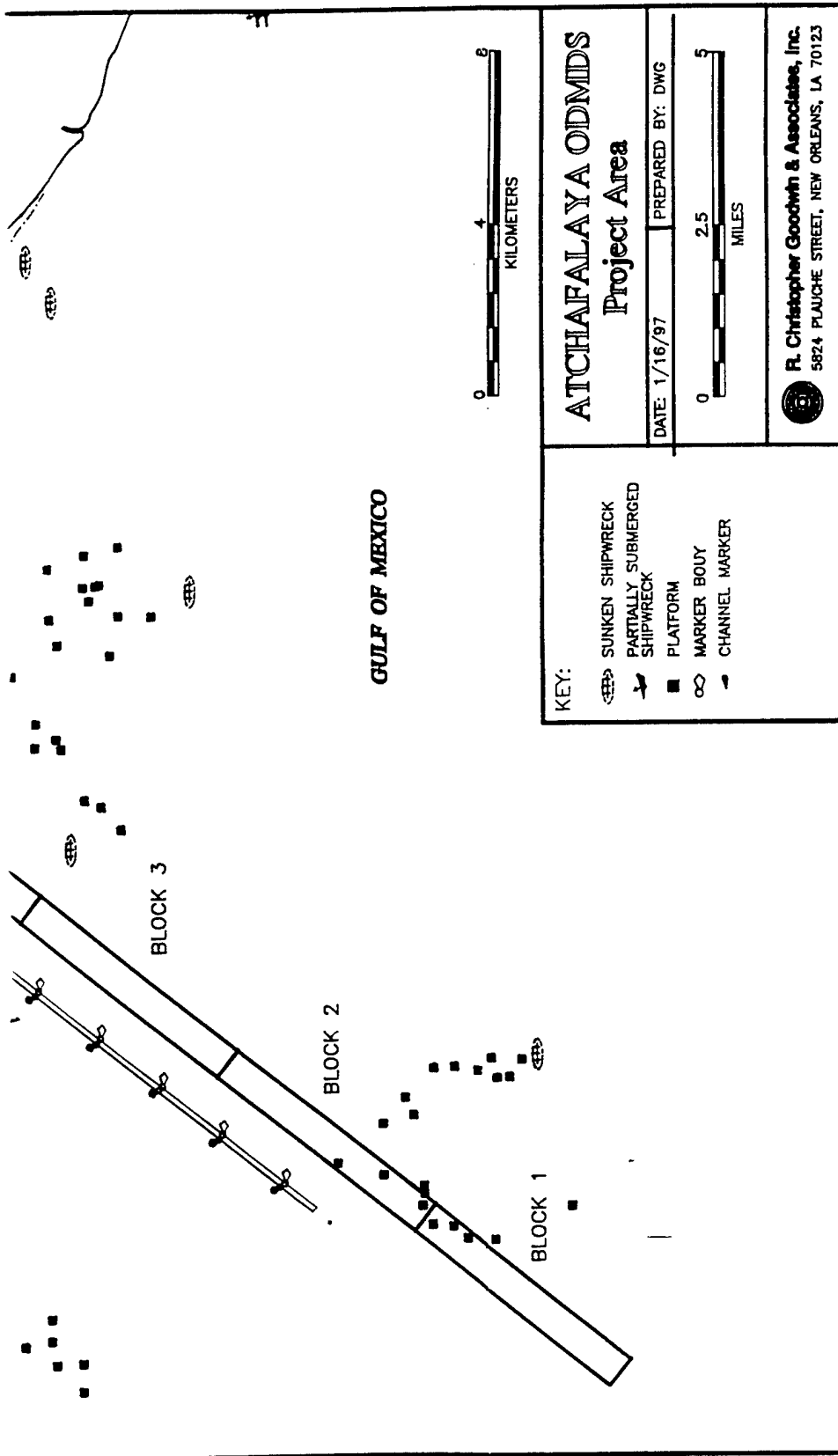


Figure 2. Atchafalaya ODMDS project area, showing marine archeological survey blocks

assess sedimentation rates in the vicinity of the mouth of the Atchafalaya River. Also, secondary sources were consulted for background information pertaining to historic maritime activity in coastal Louisiana and, in particular, in the vicinity of the Atchafalaya River.

Archeological investigations, conducted during the months of June, July, and August 1996, consisted of a controlled remote sensing marine survey, utilizing a digitally-integrated system of electronic surveying equipment. Acoustic, bathymetric, and magnetic data from the survey were post-processed, analyzed, inventoried, and correlated. In addition, detected anomalies were plotted graphically to assist in determining whether or not they represented potentially significant cultural resources warranting further investigation. A sample of anomalies and anomaly clusters that exhibited characteristics that made them appear potentially significant were subjected to additional surveying, during which a more refined methodology was employed, with more tightly spaced survey transects to generate more detailed information on each target's configuration and complexity.

Organization of the Report

Chapter I contains descriptions of the project, its location, and the project objectives. The natural and cultural settings of the research area are presented in Chapter II. Chapter III explains the research design and summarizes the research methodologies employed during the study. Results from archival and archeological investigations are presented in Chapter IV. Chapter V provides a project summary and management recommendations. Appendix I consists of the Project Scope of Services. Inventories of acoustic, bathymetric, and magnetic anomalies detected during the initial survey are presented in Appendices II, III, and IV, respectively. Inventories of acoustic, bathymetric, and magnetic anomalies discovered in the resurveyed areas are presented in Appendices V, VI, and VII, respectively. Appendix VIII contains the resumes of key project personnel.

CHAPTER II

NATURAL AND CULTURAL SETTING

Natural Setting

Southern Louisiana has the most active and dynamic coastline in the United States (Williams et al. 1996:7). The coastline primarily is shaped by silts and clays carried in suspension by the Mississippi and other rivers and deposited along the coast. The Atchafalaya Basin is subject to the same types of dynamic forces, with its numerous rivers, lakes, and streams constantly flooding and changing their courses and sediment deposition patterns.

The project area is located in a humid, subtropical climate, with long, hot, rainy summers, and short, mild winters. The average temperatures, according to the United States Weather Bureau Station at Franklin, Louisiana, are 27.5° C (81.5° F) in the summer and 15.5° C (60° F) in the winter. On average, precipitation measures 66.84 in (169.77 cm) annually, with July being the wettest month and October the driest. Thunderstorms are common, while snowstorms in the winter are rare. Hurricanes and tropical storms occur every few years and represent the most dangerous weather threat in the region (Williams et al. 1996:68).

Vegetation in the Atchafalaya Basin is largely dependent on the elevation of the land above sea level. The driest conditions are found on natural levee crests. Prior to historic settlement, these crests supported forests of hardwoods such as live oaks, cherrybark oaks, wateroak, redgum, American elm, winged elm, pecan, persimmon, and honeylocust. The natural levee crests have been largely deforested because of historic settlement and agriculture, both of which predictably focussed upon the drier ground. The vegetation in the swamps includes cypress, tupelogum, swamp blackgum, water ash, Virginia willow, and button bush. The marshes are covered with various species of grass, sedge and rushes (Goodwin et al. 1984:18-19).

Open waterways in the region, as well as marshes and backswamps, support economically important species of wildlife such as white and brown shrimp, blue crabs and oysters, as well as muskrat, otters, mink, and raccoon. Nutria are a more recent addition to the area. Game species include deer, squirrel, and rabbits, and migratory wildfowl are present seasonally. The American alligator also is found in bayous and backswamps (Robinson and Seidel 1995:12).

Geomorphic Context

The project area runs along the east side of the Atchafalaya River Bar Channel, known locally as the Eugene Island Ship Channel, seaward of Point au Fer Shell Reef. To the north lies Atchafalaya Bay, a shallow embayment that is fed by the Atchafalaya River and dominates the St. Mary Coastal Region (Goodwin et al. 1991). The flat bottom of the bay lies approximately 6 to 7 ft (2 m) below mean water level. The Point au Fer Shell Reef effectively demarcates the southern extent of the bay, separating it from the project area (Figure 2). Extending westward from Point au Fer, the top of the shell reef is generally level with the mean water level, and it works to break up waves moving north from the Gulf of Mexico. A number of tidal-scour channels, some reaching depths of 45 feet (13.7 m) or more, penetrate the reef. The reef is also penetrated by a shipping channel, the Atchafalaya River Bar Channel, which runs from the mouth of the Lower Atchafalaya River and Delta through the bay and the reef. The channel extends seaward another 15 miles (24.14 km) southwest of the Point au Fer Shell Reef. Gulfward of the reef, the gulf bottom gradually drops

from a charted depth of approximately 3 to 5 feet (0.9 to 1.5 m) near the reef (outside of the channel) to 23 feet (7 m) in depth at the southern end of the project area.

The geological sequences relevant to the submerged cultural resources of the project are fairly well understood. An early entrenched valley of the Mississippi River runs through the southeastern portion of Atchafalaya Bay and the project area, approximately 150 ft (45 m) below current mean sea level (Autin et al. 1991; Heinrich ND). The valley is a relict of the Late Wisconsinan Substage and is filled with a series of unnamed Late Pleistocene and Holocene sedimentary sequences, each separated by a ravinement surface which resulted from transgressive erosion (Heinrich ND; Connors et al. 1991; Roberts et al. 1991). This fill is overlain by sediments of the Teche Delta Complex (formation beginning ca. 5800 BP), the top 6.5 to 20 ft (2 to 6 m) of which (and the original delta plain) has been eradicated by erosion. Lying above the ravinement surface, at the top of the Teche deposits, is the LaFourche Delta Complex (formation beginning ca. 4800 BP), made up of three facies. The first of these is a highly bioturbated combination of clays. Second, within these clays lie two sedimentary beds containing large amounts of shell. Third, deposits of interlocking shell form the many shell reefs that lie embedded within the LaFourche Delta Complex. The oyster (*Crassostrea virginica*) and other bivalves that made up these reefs presumably would have provided a resource useful to prehistoric inhabitants of the area.

Above the LaFourche deposits lies the Atchafalaya Delta Complex, a 6.5 to 10 ft (2 to 3 m) thick sequence of deltaic sediments, the bulk of which were deposited between 1839 and 1890. The prodelta facies of the Atchafalaya Delta Complex cover all of the Atchafalaya Bay and extend gulfward of the Point au Fer Shell Reef. They are made up of two subfacies. The brown-gray clays of the lower subfacies are highly bioturbated, and the base of the facies is thought to date to 1839 or immediately thereafter. This is the date at which the infamous logjams of the Red River were first cleared, contributing to a significant increase in Red River flow into the Atchafalaya and subsequent sedimentation. The upper prodelta subfacies consists of a series of 4 in (10 cm) thick beds of red-brown silty clays and clays. Each clay or silty clay bed is separated by a thin silt lens, and the presence of polychaete worm burrows has been noted in the facies. This upper prodelta subfacies is thought to postdate 1952 (Heinrich ND).

Significant sedimentation also accumulated outside of Atchafalaya Bay, on the shelf gulfward of Point au Fer Shell Reef, in the project area. Between 1890 and 1935, approximately 6.5 ft (2 m) of sediment was deposited in this area. Between 1935 and 1951, another 2 ft (0.6 m) of sediment may have accumulated, however data on bathymetric changes in the project area after 1952 are scarce (Heinrich ND:10).

Within the Atchafalaya Bay itself, the sedimentation rate increased markedly in 1952, the first year in which a measurable deltaic deposition occurred there. Upstream sedimentation resulted in the filling of many of the lakes within the Atchafalaya Basin, a process which was completed by 1950 to 1951. As a result, the coarser silt and sand size sediments which previously had been trapped in those lakes were transported into the bay, and over 20 ft (6 m) of sediments were deposited south of the river mouth by 1962. The rate of sediment transport further increased during the late 1960s and early 1970s, as the annual mean flow of the Atchafalaya River increased by about 20 percent (calculated from data in Heinrich [ND:11]). Although data has been lacking, the presumption has been that sediment accumulation has continued on the continental shelf outside the Point au Fer Shell Reef (Heinrich ND:12).

This presumption of increased sedimentation gulfward of the Point au Fer Shell Reef is supported by hydrological evidence. Discharge from the Atchafalaya River maintains a strong surface flow of sediment laden freshwater over the more saline bay waters. In addition, strong tidal currents are created within Atchafalaya Bay by wind and astronomical tides. These currents help

to maintain the narrow but deep tidal channels through the reefs and flush clay-size and organic sediments out of the bay and onto the continental shelf (Heinrich ND:13).

In addition, a cyclical pattern to sediment deposition and redistribution has been observed in the bay (Smith, Dunbar and Britsch 1986), with major increases in deltaic growth correlated to major flow discharges for the Mississippi-Atchafalaya. This progradation is followed by a reworking of sediments by wave action, and seasonal weather shifts increase wave energy and enhance erosion. As described by Smith, Dunbar and Britsch (1986:58), the southerly winds which precede active cold fronts in the late fall to early winter push water toward the shore, increasing the level of water within the bay. When a cyclonic cold front moves through, the rapid shift to northerly winds swiftly forces water from the bay, taking sediment with it onto the continental shelf. As a result of these processes, some projections of subaerial land growth in the Atchafalaya show the eventual emergence of subaerial deposits gulfward of the Point au Fer Shell Reef, across the project area (Smith, Dunbar and Britsch 1986).

The depositional sequences outlined above, as well as the transformational processes which have worked upon them, potentially have a great significance for the preservation of cultural resources in the project area. These impacts will be considered toward the end of this chapter, after the historical background and survey results have been reviewed.

Historical Setting

Cultural Units and Themes

Louisiana's Comprehensive Archeological Plan (Smith et al. 1983:127) organizes the state's history into cultural units, which are useful in the examination of a particular cultural phenomenon in time and space. The plan also provides a framework for highlighting cultural characteristics and for prioritizing research. The state's Department of Culture, Recreation, and Tourism has defined 14 cultural units for the state. These units have been utilized to create an historic context for the Atchafalaya ODMDS survey area. The cultural units associated with prehistoric cultures are grouped into one section and discussed only briefly, because of the low potential for discovering intact submerged prehistoric sites within the project area. The cultural units more relevant to this study include the following: Historic Contact; Exploration and Colonization; Antebellum; War and Aftermath; and Industrialization and Modernization.

Thematic discussions will be geared toward the Atchafalaya River and the project area. In addition to the cultural units that are used to subdivide Louisiana's history and prehistory, the state's archeological plan (Smith et al. 1983) delineates specific themes for each of the state's six regional Management Units. These themes identify significant cultural topics central to examination of the state's past. The survey area lies within Management Unit V, and four of the archeological themes identified for the unit have potential relevance for this study: Theme 21, "Flatboats and Keel boats in the Westward Migration;" Theme 22, "The Steamboat Era;" Theme 23, "Civil War Rivercraft;" and Theme 24, "The Towing Industry, Tugs and Barges." Management Unit VI, encompassing as it does all water bottom lands within the state of Louisiana, also includes the project area. All of the themes identified for this management unit are of potential significance for this investigation. They include: Theme 1, "Submerged Archeological Sites;" Theme 2, "Eighteenth Century Maritime History;" Theme 3, "Flatboats and Keelboats in the Westward Migration;" Theme 4, "The Steamboat Era;" Theme 5, "Civil War Rivercraft;" and Theme 6, "The Towing Industry, Tugs and Barges." The historical background which follows provides an overview of the area's prehistory, history, and shipwreck potential.

Prehistoric Overview

The potential for submerged prehistoric resources in the project area is dependent in large part upon geomorphology. Sea level at 12,000 BP, the commonly accepted date for the emergence of humans in the Gulf of Mexico region, was approximately 196.6 ft (60 m) below present sea level. The continental shelf shoreward of the 196.6 ft (60 m) bathymetric contour, including the entire project area, generally is therefore considered to have the potential to hold prehistoric sites. This "high potential zone" may be further subdivided, with specific geomorphological features having a much higher probability of associated prehistoric features. Relict geomorphic features that have potential for associated prehistoric sites include tidal estuaries, embayments, barrier islands, beach ridge sequences, spits, alluvial terraces, and stream channels. Remote sensing surveys that utilize a subbottom profiler may identify such geomorphological features, as the profiler can penetrate more recent bottom sediments to reveal the earlier features (Minerals Management Service 1995a, 1995b; Coastal Environments 1977, 1982, 1986). Often, however, ravinement and postdepositional erosion processes on earlier deltaic complexes will have disturbed or destroyed many of the deposits with the potential to hold prehistoric cultural resources. Submerged terrestrial sites were not a high priority for this survey, as the disposal of dredged material over the already deeply buried relict features is unlikely to have a negative impact upon such resources. In addition, recent work in the area with subbottom profiling equipment has resulted in little or no acoustic penetration of the bottom sediments, thereby nullifying the instrument's effectiveness. The lack of penetration is due to the presence of biogenic gases such as methane and carbon dioxide (products of decaying organic matter), as well as elevated levels of trapped water in the bottom sediments (Behrens, Samson, and Seidel 1997:7). The project Scope of Work therefore did not specify the use of a subbottom profiler.

Subsequent to the rise to current sea level, during both the prehistoric and early historic periods, settlement within the Atchafalaya Basin as a whole was sparse. The swampy nature of the Basin, with limited amounts of dry ground, precluded long term settlement for much of the prehistoric period. High ridges along the coastline are more likely to have seen habitation than many of the inland areas, and exploitation of coastal and estuarine resources undoubtedly occurred (Pearson and Saltus 1991). Much of the movement of prehistoric peoples through the area was by necessity accomplished on the water, and dugout canoes were the prevalent mode of water transportation before and immediately after initial European contact in the region. Canoes generally were constructed from a single cypress log and often attained lengths of over 30 ft (9 m) (Pearson et al. 1989). These small craft must have been lost occasionally, both along the coast and on inland waterways. Discovery of such remains during this survey was considered unlikely, due to their nature and the survey methodology prescribed in the Scope of Work. Lacking ferrous fasteners or hardware, dugout canoes are unlikely to be detected by a magnetometer, and would be detected by side scan sonar only if bottom sediments were in the process of erosion or deflation, neither of which appear to be the case within the project area.

Historic Overview

Historic Contact. During the historic contact period in the Gulf of Mexico, European activity around the project area primarily was limited to oblique contact via transient shipping. Garrison et al. (1989) and Pearson et al. (1989) have described the region's shipping routes from an historical perspective. Aside from poorly documented pre-Columbian sea trade, the earliest commerce on Gulf waters was dominated by the Spanish. Early routes through the northern Gulf of Mexico were used primarily for travel to and from Spain's profitable holdings in Central America. From 1519 on, Spanish fleets traversed the Gulf from Vera Cruz to Havana, taking advantage of a clockwise current which ran through the Gulf. From Havana, these vessels joined ships from Panama and returned to Spain via the Florida Straits, picking up the northerly Gulf Stream.

Exploration and Colonization. Occasionally these sea routes brought Spanish vessels into the coastal waters along the northern Gulf and past the project area, but it was not until many years later that ports developed in this part of the Gulf and trade increased. The emergence of this new activity and the subsequent development of new trade routes was precipitated by the French. The abortive expedition of LaSalle in 1685 was followed by the more successful establishment of New Orleans by Iberville in 1699. France established additional footholds at: Biloxi (1699); Dauphin Island, south of Mobile Bay (1699); and Mobile Bay (1701). Shipping routes linked these ports with New Orleans, as well as with the Windward Islands. In the first half of the eighteenth century, the French attempted to expand these routes to include Spanish ports, but with the exception of connections between Mobile and Spanish Pensacola, these efforts failed.

The first Acadian settlement in Louisiana was established along the Bayou Teche, in the Attakapas country, but by the 1790s Acadians had spread along the Mississippi in what are now Ascension and St. James Parishes, and along the northern half of the Bayou Lafourche. These settlers were small farmers who built dispersed settlements along the bayous; each settlement was comprised of a cluster of houses. Agricultural foods and income were supplemented by hunting, trapping, and fishing (Goodwin et. al. 1984:21).

In the later colonial period, French activity in the northern Gulf waned, while Spanish trade was increasingly joined by British vessels. As settlements grew, coastal trade became ever more important, with small vernacular craft linking coastal areas and inland settlements. The most common craft used on the inland waterways of Louisiana, a vessel based on the native dugout canoe, was the pirogue (Pearson and Saltus 1991:26). Other vessel types such as the chaland, esquif, and bateau also were used on the waterways of the Atchafalaya Basin (Pearson and Saltus 1991:26; Pearson et al. 1989). The shallow and often narrow waterways in the region were a key factor in the development of these small, flat-bottomed boats.

Antebellum Period. Early in the nineteenth century, the economic and political situation in France forced her to sell the Louisiana colony to the United States for \$15 million. The 1803 acquisition of the Louisiana Territory by the United States brought a new influx of settlers, primarily Anglo-Americans from the southern and western part of the country. Some of these new immigrants acquired extensive tracts of land and established large inland plantations in Terrebonne Parish. Large landholdings were essential to the plantation economy which was emerging, and the ready access of these new residents to capital made their acquisition efforts successful. One result of this shift in land use and ownership was the displacement of much of the Acadian and Houma Indian population. These groups were forced south, into coastal bayous such as those near the project area. The smaller amount of arable land in these areas had made earlier settlement unattractive, and the new residents were forced to rely more heavily upon extractive pursuits such as trapping, hunting, and fishing (Stout 1992:10; Robinson and Seidel 1995:14).

After the American acquisition of Louisiana, the slave trade and the export of cotton and sugar became important elements of the region's maritime commerce. The development of this economic base in the area led to the development of a plantation economy in the early nineteenth century (Pearson and Saltus 199:27). Cotton and sugar were shipped out of the Gulf to the east coast of the United States (principally to New York, which controlled much of the region's trade) and to Europe. Throughout the nineteenth century, sugar production became increasingly important; in the years before the Civil War, its production had spread to almost all of the arable land in the area (Pearson and Saltus 1991:28). Until the development of an adequate railroad network, the vast bulk of the South's products was transported by water, with New Orleans serving as the primary shipping port in the south. The traffic for this and other commodities was often seasonal, with cotton being shipped primarily from September to May (Murphy and Jonsson 1993:156).

Inland of the Atchafalaya's mouth lay a complex network of rivers, streams, lakes, bayous and backwaters, and this network was used for communication and trade between inland settlements and coastal gateways such as New Orleans. Although some early water traffic reached these inland areas via the Atchafalaya Bay and River, it was not until the 1830s or '40s that shipping began to reach the area regularly by sea. Pearson & Saltus (1991:31) quoted the following advertisement for the *Belle of Attakapas* as an example of this shift:

The substantial and well known steamer Belle of Attakapas, Captain C. Johnson, having been thoroughly repaired, and refitted, will run, on the sea route as a regular packet throughout the season, between New Orleans and New Iberia, taking freight and passengers for all intermediate landings on the Teche, Atchafalaya & Bayou Boeuf (October 18, 1845, edition of *The Planters Banner*).

New Iberia, one of the more important inland settlements, was reached via the lower Atchafalaya River and Bayou Teche. Before and after this period, smaller, light draft steam vessels, which were ill-suited to the hardship of an open Gulf passage, threaded the inland waters between ports of call such as New Iberia and New Orleans, but the Gulf route became increasingly important. Closer to the mouth of the Atchafalaya than New Iberia lay the town of Franklin, which was still many miles upstream from the Gulf. It provided access to the interior for relatively deep draft vessels, via the Atchafalaya and lower Bayou Teche (Pearson and Saltus 1991:29). Pearson and Saltus (1991:29) illustrated this access with a list of arriving and departing vessels from early December of 1846, and emphasize the activity of ocean-going vessels in the area during this period. In the 1850s, Brashear City was established on the site of modern-day Morgan City, providing a more convenient gateway to the Gulf through the Atchafalaya.

Civil War and Aftermath. The economic and social impacts of the Civil War on the region were devastating. During the war, Union blockade effectively suppressed commercial shipping and coastal trade, and agriculture and commercial water traffic essentially ceased (Pearson and Saltus 1991:38; Comeaux 1972:17). Aside from logistical support for the military, the only commercial ventures were carried out by blockade runners, who ran great risks for substantial profits. New Orleans and Mobile were two of the most important destinations for these vessels.

Industrialization and Modernization. It was not until the 1870s that commerce in the region gradually revived. Much of this new activity was spurred by the dredging of a ship channel from the Gulf to the lower Atchafalaya River. Charles Morgan financed this dredging in 1871 to allow his steamship line to navigate the Atchafalaya River up to Brashear City. "Morgan's Ditch," as it was known, was 6 mi (9.66 km) long, over 100 ft (30.49 m) wide, and 10 ft (3 m) deep (Pearson and Saltus 1991:40). Subsequent to the dredging, in 1873, Congress established Brashear City as an official Port of Entry, and in the same year the Louisiana legislature acknowledged Morgan's contributions to the regional economy by renaming the area's principal port from Brashear City to Morgan City.

During the same period in the late nineteenth century, the railroad became increasingly important to the Atchafalaya region's economic revitalization. Although the transportation of goods via the region's waterways was more economical, the railroad became the favored mode of transportation for many shippers because of its speed (Pearson and Saltus 1991:40). Speed was an especially important factor with perishable goods, and railroad expansion was therefore linked to the growth of industries such as oystering. The oystering industry around the Atchafalaya grew rapidly with the development of the new rail lines, especially after the opening of the railroad bridge at Morgan City. Within a relatively short period of time, numerous sailing luggers took up oystering and fishing out of Morgan City, taking advantage of the new rail outlet for their perishable harvests (Pearson and Saltus 1991:42).

In the wake of the Civil War, New York's hold on maritime commerce in the Gulf was broken, and traffic moved between the Gulf and many other ports. Coastal networks were joined with direct routes to the east coast, Europe, the Caribbean, and South America. Throughout the nineteenth century, general merchandise and manufactured goods were shipped into the Gulf from the northeastern United States. Outbound cargoes such as cotton were joined by exports such as lumber and lumber products, which were bound for destinations ranging from the northeastern United States to Caribbean and European ports.

Despite legislative attempts to restrict shipping to American flag vessels, increasing numbers of foreign vessels (especially European) travelled to Gulf ports. Major new ports such as Tampa and Port Arthur attracted traffic to the Gulf, while the older ports of Mobile, New Orleans, Galveston, and Brownsville were joined by numerous smaller points of entry. New ports served as gateways to a broadened export base; phosphates from Tampa and oil from Port Arthur joined the older commodities such as cotton, grain, and lumber (Garrison et al. 1989). Trade routes changed little into the 20th C., although German submarines forced shipping into shallower coastal waters for a period during World War II (Garrison et al. 1989).

In the twentieth century, the commercial traffic in the Atchafalaya Basin has been limited primarily to channels dredged or maintained by the U.S. Army Corps of Engineers. Traditional types of watercraft such as pirogues, skiffs, and bateau continue to be used by locals, although fiberglass and aluminum have almost entirely replaced wood in the construction of these vessels (Pearson and Saltus 1991:43). In the lower Atchafalaya River and the coastal area, much of the traffic today is related to oil and gas field development, along with more traditional pursuits such as fishing and shrimping.

Shipwreck Potential

Vessel Types. The types of vessels used in the northern Gulf of Mexico have received much attention in the literature. Garrison et al. (1989) have summarized succinctly the range of historic vessels involved in ocean-going trade in the Gulf. These include 26 classes that were common during the sixteenth and seventeenth centuries, 15 classes typical of the eighteenth century, and 27 classes of vessels that were characteristic in the nineteenth and twentieth centuries.

Almost all of the vessel types listed in the Garrison et al. (1989) report would have been suitable for ocean or coastwise voyages. The largest of these vessels frequented major trade routes through the Gulf and participated sporadically in coast-wise trade. They tended, however, to stay in open water until approaching port, at which point they frequented deeper channels.

Much of the coastal trade of the mid-nineteenth to early twentieth century, however, was carried in smaller vessels, and the popularity of vessel types reacted to shifts in cargoes and the balance sheets of vessel owners. Up to the 1860s, for example, lumber bound for the coastal trade and for the West Indies was generally carried in schooners with capacities of around 100,000 board feet. Lumber bound for more distant ports usually was carried by larger vessels, such as barks, brigs and ships, with capacities of up to 500,000 board feet. Through the course of the nineteenth century, however, schooners became increasingly popular as merchant vessels, especially for the coastal trade. They were able to displace vessels rigged as brigs primarily because of their ability to sail efficiently with fewer hands. For similar reasons, bark rigs gained in popularity over ships, especially after the depression experienced at mid-century. Barks were almost as fast as a full-rigged ship, but required a smaller crew (Murphy and Jonsson 1993:148-156; Eisterhold 1972:270).

Local maritime activities, ranging from simple travel to fishing, shrimping, and other water-oriented pursuits, were carried out in smaller, often locally built vessels. Discussions of the region's

smaller watercraft are included in a report by Pearson et al. (1989), reviewing the history of water traffic and craft within the area now administered by the U.S. Army Corps of Engineers, New Orleans District. Their report included a detailed discussion of the wide variety of vessel types used in the region from late prehistoric times up to the present. Stout (1992) and Robinson and Seidel (1995) also have studied the vernacular craft of the bayou and coastal waters, focussing on traditional craft built on Bayou DuLarge in Terrebonne Parish, Louisiana. The Robinson and Seidel (1995) report places such vessels in their historic context and reviews the evolution of the craft. It includes a detailed description and analysis of several recent vernacular craft, including oral histories with their builders. Other published studies of coastal Louisiana's vernacular craft include those by Knipmeyer (1956), Goodwin et al. (1984), and Comeaux (1985).

Taken together, these reports provide a substantial framework for understanding the vessel types which might have been lost within the project area. Knowledge of how these vessels were used, their routes of travel, and the misfortunes that could befall them, permits a prediction of how and where they were lost.

Traffic Routes. In the historic contact period, vessels traversing the northern limits of the Spanish routes out of Mexico and towards Havana could have passed through the offshore segments of the project area. Because of the clockwise loop current in the Gulf, this route became a standard for vessels moving east, toward the Caribbean or the Florida Straits. Storms and errors in navigation could push the track of unwary vessels into the shoals and barriers located within the project area, near the mouth of the Atchafalaya River. Coastwise trade that was headed west often traversed a route closer toward shore. A series of counterclockwise eddy currents provided an advantage to those vessels, inducing them to run closer to shore. Such natural advantages were offset by the greater potential for running afoul of shoals, and the choice of a route for any given voyage throughout the historic period always involved a weighing of advantages and disadvantages, of costs and benefits.

Although traffic during the early historic period primarily was limited to passers-by, local activity on the water eventually became intense, first as Acadians and the Houma were pushed south into the area. The environment forced the population into a reliance upon the water resources of the area, and it made boats the primary mode of transportation. During the later historic period, navigation along the bayous was enhanced through dredging and clearing and, beginning in the early 1800s, canals were dug to connect various streams and distributary lakes (Robinson and Seidel 1995:14). This growing network of inland water routes connected to the coastal bays such as Atchafalaya, Terrebonne, and Timbalier. With this more highly developed interior waterway system and the dredging of the Atchafalaya ship channel, an increasingly large volume of traffic moved through the project area. The emergence of faster shipping of perishables via rail later induced the development of fisheries with larger fleets, and the more recent development of the petroleum industry has added to the maritime activity of the region. These latter industries have tended to concentrate larger number of vessels in shallow coastal waters, thus increasing the potential for vessel loss.

Currents, Winds, and Other Natural Hazards. Navigation, trade routes, and sailing practices are heavily influenced by local environmental phenomena such as currents and winds. The system of currents in the Gulf of Mexico is controlled in large part by the location of the Loop current, which circulates clockwise, and associated counterclockwise flowing eddy currents (Garrison et al. 1989). Garrison et al. (1989) also describe the typical wind patterns for the northwest Gulf, in which typical summer winds are dominated by the easterly trades and especially by winds from the southwest. These winds often shift to the northeast during the winter months, and rapidly moving cold fronts (northers) frequently interrupt the winter pattern. The shift from summer patterns to those of winter occurs between September and October. Waves of 3.3 to 4.9 ft (1 to 1.5 m) typify conditions on

the northern Gulf of Mexico, and the highest significant wave height near the project area is nearly 13.1 ft (4 m) (Garrison et al. 1989).

Although much attention has been paid to the conjunction of storms and shipwrecks, the incidence of storms in specific parts of the Gulf and the distribution of shipwrecks are not perfectly correlated. More important is the increased likelihood of a wreck when there is a conjunction of storm paths with busy shipping routes and shallow waters, especially lee shores (Garrison et al. 1989; Irion et al. 1992). There are, of course, many other causes of shipwrecks. These include collision with another vessel, hitting an obstruction, grounding, fire, explosion, scuttling, or loss in military action. The circumstances under which these events are likely to occur are known, and this makes it possible to predict where vessel loss is most likely.

Collision is most probable where shipping activity is heavy, especially in busy channels or shipping lanes, near ports and near the mouths of navigable rivers. Morgan City's importance as a destination meant that the risk of collision around the mouth of the Atchafalaya River and in the approach channel was and continues to be higher than along other parts of the local shoreline. Foundering is most likely to occur in exposed areas, especially during storms and where waves pile up and break in shallow waters (Irion et al. 1992). These conditions are found in the near shore portions of the project area, where seas become rough as the winds increase.

Groundings occur when a vessel strikes a shoal or the shallows near a shoreline. Heavy weather can force a vessel ashore, as can errors in navigation. Engine failure or other problems often have the same result, when wind and tide push a disabled vessel aground. Although a vessel may survive these more passive groundings and be pulled off or refloated on a higher tide, groundings due to storms more often result in the loss of the vessel.

Submerged obstructions are a hazard most often encountered in shallow waters or rivers. Partially submerged and floating logs are frequently sighted in the Atchafalaya River and in the waters outside its mouth. These obstructions are more of a hazard to fast moving vessels and craft with relatively light hull fabric. Some of the light draft steam vessels designed for river travel fall into this category, as do smaller wood vessels and fiberglass craft.

Fire and explosion can happen at any time, while losses due to military activity will be related to particular events and places (Irion et al. 1992). The only record of serious military activity which might have resulted in vessel losses in this area is for the Civil War. Despite the Union blockade of the area and naval movements up the Atchafalaya, research has not revealed any Civil War losses in the project area.

Preservation Conditions. Hydrological and biological processes can be assumed to have had an impact upon any shipwrecks or other archeological remains lying within submerged portions of the project area. In the shallower portions of the project area, the seafloor is above the wave base, so that exposed archeological remains have been disturbed by both tidal currents and storm waves. The tropical storms which visit the region also can create strong bottom currents, called "geostrophic currents," which can scour the bottom.

The preservation of archeological materials in the shallow inner shelf waters of the Gulf often is poor due to environmental conditions (Irion et al. 1992). Organic materials, for example, are less likely to survive because of the medium temperatures of the sediments, their richness in oxygen, and frequent exposure and disruption by waves. Wood, in particular, suffers, due to the activity of shipworms (*Teredinidae*) and other borers such as gribbles (*Limnoria*, etc.). Deposits of silty mud from the east (originating in the Mississippi) and from the Atchafalaya River's flow, however, can have a cushioning effect upon such influences, capping off remains and reducing oxygen. Recent research also indicates that organic and other remains, even in shallow, high energy zones, often

can be surprisingly robust and well-preserved (Seidel and Murphy 1996). This serves as a caution against assuming that degradation of resources has been the rule.

CHAPTER III

RESEARCH METHODS

Archival Investigations

Background research into the project area primarily consisted of a review of existing histories of the region, including Coastal Environment's history of water traffic in the New Orleans District of the U.S. Army Corps of Engineers (Pearson et al. 1989) and other regional studies noted in the previous chapter. As discussed below, the environmental circumstances encountered within the project area necessitated additional research into the geomorphology of the area. This was accomplished through the use of secondary sources, research materials available at the Louisiana Universities Marine Consortium (LUMCON) Library in Cocodrie, Louisiana, and unpublished data made available by the USACE-NOD. Archeological site files were reviewed at the Louisiana Department of Culture, Recreation, and Tourism's Division of Archeology, and inquiries were made at the New Orleans office of the Minerals Management Service for information on previous investigations and sites in the project area. Queries were also lodged with the National Ocean Service for information on shipwrecks recorded in the Automated Wreck and Obstruction Information System (AWOIS).

Archeological Field Investigations

Survey Design

In accordance with the Project Scope of Work, background research was followed by two stages of field survey at the proposed Atchafalaya ODMS. Both stages of work required a remote sensing survey of the seabed to detect the presence or absence of evidence of shipwrecks or other submerged cultural resources within the project area. The remote sensing instruments used in the survey included a recording proton precession marine magnetometer, a side scan sonar, and a recording fathometer. The survey was conducted from June 24 - July 7, 1996, and from July 29, 1996, through August 7, 1996. Preliminary inventories of magnetic and acoustic anomalies detected during the survey were prepared in the field. Final post-processing of all acoustic, bathymetric, and magnetic data was carried out in Goodwin & Associates, Inc.'s Frederick, Maryland offices.

For the initial phase of surveying, the project area was divided equally into five areas or blocks, measuring 0.49 mi (0.789 km) wide x 3.71 mi (5.97 km) long (Figure 2). Each of these initial survey blocks contained 17 planned survey transects spaced 160 ft (48.77 m) apart and oriented along the longitudinal axis of the study area (southwest to northeast), for a combined total of 85 individual lines that traversed over 325 linear miles (523.02 km) of seabed.

Deviations from these lanes were necessary in two instances. In the first instance, gas or oil platforms obstructed the path of the survey vessel along several lanes in some of the blocks, requiring minor course deviations. These lanes were surveyed as closely to the rig as possible, at which point the boat was steered around the platform and then resumed its course once the rig was passed. In the second case, trackline course deviations were required by dredging activities that were being conducted in Block 4 concurrently with the remote sensing survey. A discharge line from a dredge working in the Atchafalaya River Bar Channel was set so that it ran east across the block (approximately 1.75 mi [2.82 km] north of Block 4's southern terminus) and dumped spoil into

the survey area. Consequently, the central portion of Block 4's Lines 2-9, an area measuring approximately 1,120 ft (341 m) wide and 1,600-1,900 ft (396 - 579 m) in length, could not be surveyed.

The second phase of fieldwork commenced immediately after the initial survey was completed. The Project Scope of Work stipulated a closer examination of anomalies, using tighter lane spacing, and recommended probing of the ocean bottom, if possible, to locate buried structures. The intent of this more refined survey was to closely examine targets that had the greatest potential to represent submerged cultural resources, based on their magnetic and acoustic characteristics as observed during the initial survey. In consultation with the USACE-NOD, it was decided to resurvey a total of seventeen small blocks within the project area using a 50 ft (15.24 m) lane spacing. These consisted of three 700 ft (213.36 m) sq blocks, thirteen 600 ft (182.88 m) sq blocks, and one 300 ft (91.44 m) sq block. These seventeen smaller blocks were placed over 45 anomalies that had been recorded during the initial survey.

Overview of Instrumentation

The advent of highly accurate real-time satellite positioning, compact computer hardware, versatile hydrographic surveying computer software, sensitive magnetic detection devices capable of digital data output, high resolution digital color sonar imaging, and digital output depth-sounding devices has made remote sensing survey an increasingly effective method for locating and identifying submerged cultural resources. The remote sensing survey completed at the Atchafalaya ODMDS was designed to identify specific targets and/or clusters of targets that might represent potentially significant submerged cultural remains, such as shipwreck sites. Formation of these sites by natural and anthropogenic forces typically scatters ferrous objects such as fasteners, anchors, weaponry, ballast, cargo, and tools across the seabed. These objects can be detected by recording proton precession marine magnetometers, side scan sonar systems, and fathometers that are able to record the presence or absence of anomalous magnetic, acoustic, and/or bathymetric underwater targets. Generally, these detected targets produce an anomaly, relative to the ambient magnetic or visual field. Because the patterns of distribution and the durations of these anomalies are important to the interpretation of their potential historic significance, it is essential that accurate positioning for individual targets is established.

Positioning

Unlike their terrestrial counterparts, who have topographic or geophysical features that they may rely on to assist them in locating and relocating archeological sites, marine archeological surveyors must depend solely upon methods such as electronic satellite positioning to produce precise locational coordinates for individual targets that are otherwise invisible above the flat, featureless surface of the water. Accurate positioning is therefore a crucially important aspect of marine remote sensing surveys. Without such positioning, it is difficult or impossible to reliably shift the location of a proposed undertaking to avoid adverse affects to a particular feature. It is equally difficult to relocate targets when diver inspection is required during subsequent field investigations. For all the remote sensing investigations Goodwin & Associates, Inc. undertakes, the Global Positioning System (GPS) is employed to achieve positioning accuracy.

The GPS, which became operational in 1992, is a navigational system based on satellite ranging from a baseline constellation of 24 satellites operating in six orbital planes. The system provides accurate three-dimensional positioning and velocity, as well as precise time, to users anywhere in the world, 24 hours a day (Weber and Tiwari ND). Also known by the acronym NAVSTAR, this satellite system is maintained by the U.S. Department of Defense (DoD). Typically,

four satellites are required for navigation purposes, and the four offering the best geometry can be selected manually or automatically by receivers using ephemeris information transmitted by the satellites. The GPS works by measuring the time it takes for a radio signal from each of the four satellites to reach the receiver, which it then uses to calculate the distances between the receiver and the satellites, based on the fact that radio waves travel at the speed of light, 186,000 mi (300,000 km) per second (Hurn 1986). The location of the receiver is then triangulated from the known satellite range data. The altitude of the satellites eliminates the signal errors inherent in ground-based Loran radio transmissions. Using GPS alone, true position accuracies of 30 ft (9 m) or better may be expected. However, because the GPS was designed as a defense system, the DoD intentionally degrades the accuracy of the GPS using an operational mode called "Selective Availability", or S/A, which is intended to deny hostile forces the tactical advantage of GPS positioning. When S/A is engaged, the accuracy of GPS positioning drops to within 330 ft (100 m), a range that clearly is unacceptable for surveying and navigational purposes.

Because the S/A degraded GPS signal did not meet the US Coast Guard's (USCG) requirement of 26-65 ft (8-20 m) accuracy for navigating harbors, they developed their own system of differential corrections that enables them to effectively circumvent S/A's built-in errors. These differential corrections are generated by fixed "reference stations" and broadcast by marine radio beacons over a relatively limited area, with a broadcast radius of 250 mi (402.33 km) to Differential GPS (DGPS) receivers. The precise geographic location of the reference station, which is known, is compared to the degraded position transmitted by the satellite. This comparison of the known position with the S/A position allows the errors to be isolated and a correction factor can then be calculated. These corrections are then broadcast to DGPS receivers. The receivers convert this data into extremely precise position, heading, and speed information. The DGPS can provide accurate positioning of 7 - 33 ft (2 - 10 m) for dynamic applications and accuracies of better than 7 ft (2 m) for static users (Weber and Tiwari ND).

R. Christopher Goodwin & Associates, Inc. used DGPS during the Atchafalaya ODMS survey to provide real-time positioning. Differential correcting signals were received from the USCG's transmitting station at English Turn, Louisiana, and were processed by a Northstar 941XD with an internal DGPS receiver. Instantaneous data transformations from WGS-84 geographic to NAD-27 state plane coordinates were performed within the Northstar 941XD. These transformed positioning data were transmitted in NMEA 0183 code to a computer navigation system, consisting of an IBM Thinkpad Pentium computer with a one gigabyte hard drive. The NMEA 0183 code was received from the DGPS device through a communications port and processed using Coastal Oceanographics' *Hypack* (Version 6.4 for Windows 95) computer software. *Hypack* translates the NMEA message to display the vessel position on a computer monitor relative to the preplotted survey transects, which the research vessel pilot uses as a navigational aid during the survey, and *Hypack* logs the incoming positions in ASCII format. After completion of the fieldwork, the positioning files are utilized by *Hypack* in post-processing to produce track plot maps and to derive X, Y, and Z coordinates to create contour plots of magnetic or bathymetric data.

For the Atchafalaya survey, track lines were spaced 160 ft (48.78 m) apart during the initial phase of work. *Hypack* logged a constant stream of DGPS locational information that was attached to the incoming magnetic and bathymetric data. Positioning information for the acoustic data was transmitted by the DGPS unit directly to the side scan sonar's processor, and all processor clocks were synchronized. All magnetic, acoustic, bathymetric data records were later correlated using time and position information.

Coordinate Reporting. The coordinates of individual anomalies supplied in this report were derived originally from the DGPS positioning system in latitude and longitude coordinates referencing the WGS-84 datum. However, because of engineering requirements, the USACE-NOD requested that coordinates be supplied in Louisiana State Plane (South), referencing the North

American Datum of 1927 (NAD-27) and the Clarke 1866 local projection. This necessitated not only a datum shift from WGS-84, but also a conversion from an ellipsoidal to a planar coordinate system. It is important to understand these distinctions, because they can have an important effect on any subsequent work performed in the area involving the reacquisition of specific targets.

The State Plane Coordinate System of 1927 (so called because it was based on the North American Datum of 1927) was devised by the U.S. Coast and Geodetic Survey (USC&GS) in the 1930s. Its purpose was to allow surveyors and engineers to compute accurate coordinates using plane trigonometry. Corrections to observed angles and distances are made to account for discrepancies between planar and ellipsoidal computations. Originally, tables of constants were computed by USC&GS using common logarithms. Later, Claire (1973) provided algorithms and constants for machine computations of positions. These algorithms were designed to duplicate the results obtained using the tables and to be intentionally inaccurate to a slight degree to simulate the results that had been obtainable by hand calculation (Floyd 1985:5).

The State Plane Coordinate System of 1983 was necessitated by the 1983 adjustment of the North American Datum, a direct result of the accuracies that are afforded now by satellite positioning. For all practical purposes, NAD-83 and the global standard WGS-84 are identical and represent a vast improvement in accuracy over the old 1927 survey.

The transformation from the 1927 coordinate system to that utilizing the 1983 datum is far from complete. Because most existing mapping utilizes the 1927 datum, coordinates continue to be supplied in that form. The coordinates supplied in this report were automatically calculated internally by the Northstar 941XD DGPS, using an abridged Molodensky formula and the Northstar's default settings for the mean CONUS parameters ($\delta x = -8$, $\delta y = 160$, $\delta z = 176$).

Magnetometry

The recording proton precession marine magnetometer is an electronic instrument that records the strength of Earth's magnetic field in increments of nanoTeslas or gammas. Magnetometers have proven useful in marine research as detectors of anomalous distortions in the earth's ambient magnetic field, particularly distortions that are caused by concentrations of naturally occurring and man-made ferrous materials. Distortions or changes as small as 0.5 gamma are detectable when operating the magnetometer at a sampling rate of one second. Magnetic distortions caused by shipwrecks may range in intensity from several gammas to several thousand gammas, depending upon factors such as the mass of ferrous materials present, the distance of the ferrous mass from the sensor, and the orientation of the mass relative to the sensor. The use of magnetometers in marine archeological research and the theoretical aspects of the physical principals behind their operation are summarized and discussed in detail in Aitken (1961), Hall (1966, 1970), Tite (1972), Breiner (1973), Weymouth (1986), and Green (1990).

Individual anomalies produce distinctive magnetic "signatures." These signatures may be categorized as falling into one of four varieties: 1) positive; 2) negative; 3) dipolar; and 4) multicomponent. Positive and negative anomalies refer to monopolar deflections of the magnetic field and usually indicate a single source. They produce either a positive or negative deflection from the ambient magnetic field, depending on how the object is oriented relative to the magnetometer sensor and whether its positive or negative pole is closest to the sensor. Dipolar signatures display both a rise and a fall above and below the ambient field and are also commonly associated with single source anomalies, with the dipole usually aligned along the axis of the magnetic field and the negative peak of the anomaly falling nearest the north pole. Multicomponent or complex signatures consist of both dipolar and monopolar anomalies spread out over a relatively large area, indicative of the multiple individual ferrous components that characterize a debris field, such as those that are

typically associated with shipwrecks. The complexity of the signature is affected partially by the distance of the sensor from the debris. If the sensor is close to the wreck, the signature will be multicomponent; if far away, it may appear as a single source dipole signature.

Numerous attempts to characterize the types of magnetic disturbances made by shipwrecks (Clausen 1966; Clausen and Arnold 1975:169) have been unsuccessful, because, as Gordon Watts has observed, "the remains of vessels can be demonstrated to generate every type of signature and virtually any combination of duration and intensity" (Watts 1986:14). Murphy and Saltus (1990:95) have warned that "the quest for a 'signature' for any particular wooden shipwreck is time ill spent...", and point out that it is impossible to distinguish a genuine shipwreck site from one formed by "...cable, iron sewer pipe, and spikes." In fact, modern debris has been shown to generate virtually the same dipolar or multicomponent signatures as those produced by iron and steel hulled ships (Irion and Bond 1984; Irion 1986).

However, some researchers feel that progress has been made in developing an interpretive framework for analyzing magnetic data and discriminating between modern debris and shipwrecks. In a major study conducted by Garrison et al. (1989) for the Minerals Management Service, two offshore lease blocks were surveyed with a transect interval of 164 ft (50 m). A three-dimensional contour map of the resulting anomalies was created, and the sources of the anomalies were inspected by divers. The objective of the study was to compile a sample inventory that would reflect a real population of shipwrecks or modern debris in the study area. The researchers concluded that the relationship of magnetic signatures and their spatial distribution is critical to determining patterns for shipwrecks and then discriminating these patterns from those of ferromagnetic debris (Garrison et al. 1989:214). In essence, Garrison's conclusions agree with those of Arnold (1982) who has stated that "the patterning of anomalies on adjoining survey tracks (spaced 50 m apart) is the key to identifying significant anomalies and distinguishing them from those far more numerous anomalies caused by isolated iron debris, which often show up only on one track."

Lane spacing becomes a key component when attempting to distinguish the signature of a shipwreck from those of the debris that litters the bottom of most waters, and dissenting opinions argue that Garrison et al. (1989) and Arnold (1982) utilized intervals that were too wide for reliable detection of wrecks. In other words, with a lane spacing as wide as 150-164 ft (45.73-50 m), even shipwrecks may show up as a single anomaly rather than as a cluster, or a small ferrous mass might not show up at all, particularly if it is located midway between two survey lanes. The distance between the sensor and the anomaly source is critical, because the decrease in the intensity of an anomaly does not follow a straight arithmetic progression with increasing distance. Instead, intensity diminishes very rapidly, as the inverse cube of the distance. The Submerged Cultural Resources Unit (SCRU) of the National Park Service therefore advocates a minimum lane spacing interval of 100 ft (30 m) to achieve a high degree of certainty for the recognition of historic shipwrecks from their magnetic components (Murphy and Saltus 1990:94). Their reasoning is that during a survey with tightly spaced track lines, it is more likely that the magnetometer will pass directly over a large debris field at least once and that its magnetic signature may be more easily detected over multiple lanes. In addition, magnetic sources with lower amplitude, but nonetheless significant, signatures also may be detected with narrower lane spacing.

A Geometrics G866 recording proton precession marine magnetometer was used during the Atchafalaya ODMDS survey. To obtain precise measurements of the magnetic field with 0.5 gamma resolution, data was collected at a one second sampling rate. All magnetic data was output in NMEA 0183 code to one of the navigation computer's four serial ports, where it was read by the *Hypack* computer software as a Z value, time-tagged as it was recorded along with precise real-time coordinates from DGPS, and logged to the hard drive along with the bathymetric data. Background noise during the survey did not exceed +/- 3 gammas, and the magnetometer sensor was towed

far enough behind the survey vessel that noise from the vessel was eliminated. The offset and layback distances of the magnetometer from the GPS antenna were entered into *Hypack*, and positions for each magnetic reading were corrected accordingly by the software. Records for the survey were produced in digital format.

Acoustic Imaging

Over the course of the past 25 years, the combined use of magnetic and acoustic (sonar) remote sensing equipment has proven to be the most effective method of identifying submerged cultural resources and assessing their potential for further research (Hall 1970; Green 1990). When combined with magnetic data and bathymetric records, the near photograph-quality sonagram records produced by state-of-the-art side scan sonar systems have left little doubt regarding the identifications of targets that are intact shipwrecks or other cultural resources (Figure 3). For targets lacking structural integrity, however, or those partially buried beneath bottom sediments, identification can be extremely difficult. Because intact and exposed wrecks are less common than broken and buried wrecks, remote sensing surveys generally produce acoustic targets that require groundtruthing by divers to determine their identification and historic significance.

A state-of-the-art Imagenex color imaging digital side scan sonar system was utilized during the Atchafalaya ODMDS survey to produce sonagrams of the sea floor within the project area. The Imagenex system consisted of a Model 858 processor coupled with a Model 855 dual transducer operating at a frequency of 330 KHz. The sonar was set at a range of 180 ft (54.86 m) per channel, which yielded 200% coverage of the study area. Sonar data was recorded on a 270 megabyte 3.5 in Syquest cartridge drive. A stream of DGPS positions and time-tags were attached continuously to the sonar data, to assist in post-processing correlation of the three (acoustic, bathymetric, and magnetic) data sets. Acoustic images were displayed on a VGA monitor as they were recorded during the survey, and an observation log was maintained by the sonar technician to record descriptions of the anomalies and the times and locations associated with each target. Potential targets were inventoried both during the survey and in post-processing; particularly interesting acoustic images were transferred to another computer via .pcx files for image enhancement and printing.

Bathymetry

A Cetrek C-net Model 930-370 digital fathometer was used to record bathymetric data along the survey transects. The intent of the bathymetric study was twofold. First, it was designed to provide information on water depths throughout the project area, partly as a set of data which could be compared with earlier bathymetry. Second, it was hoped that bathymetric data might assist in the identification and evaluation of magnetic and side scan targets.

Depths from the fathometer and real time locational data from the DGPS were transmitted in NMEA 0183 code to *Hypack* and recorded. *Hypack* also calculated transducer layback and offset values, and made other corrections to bathymetric data. The raw data collected by the fathometer during the survey reflects the distance from the transducer to the sea bottom, rather than actual depth of the bottom below sea level or a datum such as mean lower low water. Two corrections therefore were made to the raw data in order to calculate the depth below mean lower low water. The first correction, made internally by *Hypack*, was to add the depth of the transducer below the surface of the water (usually three feet below surface) to every fathometer reading. The sum produced by this calculation is the distance between the water surface and the sea bottom; clearly this depth at any given point will fluctuate over time due to tidal variation. The second data correction was made to account for tidal fluctuation and to calculate a depth below mean lower low

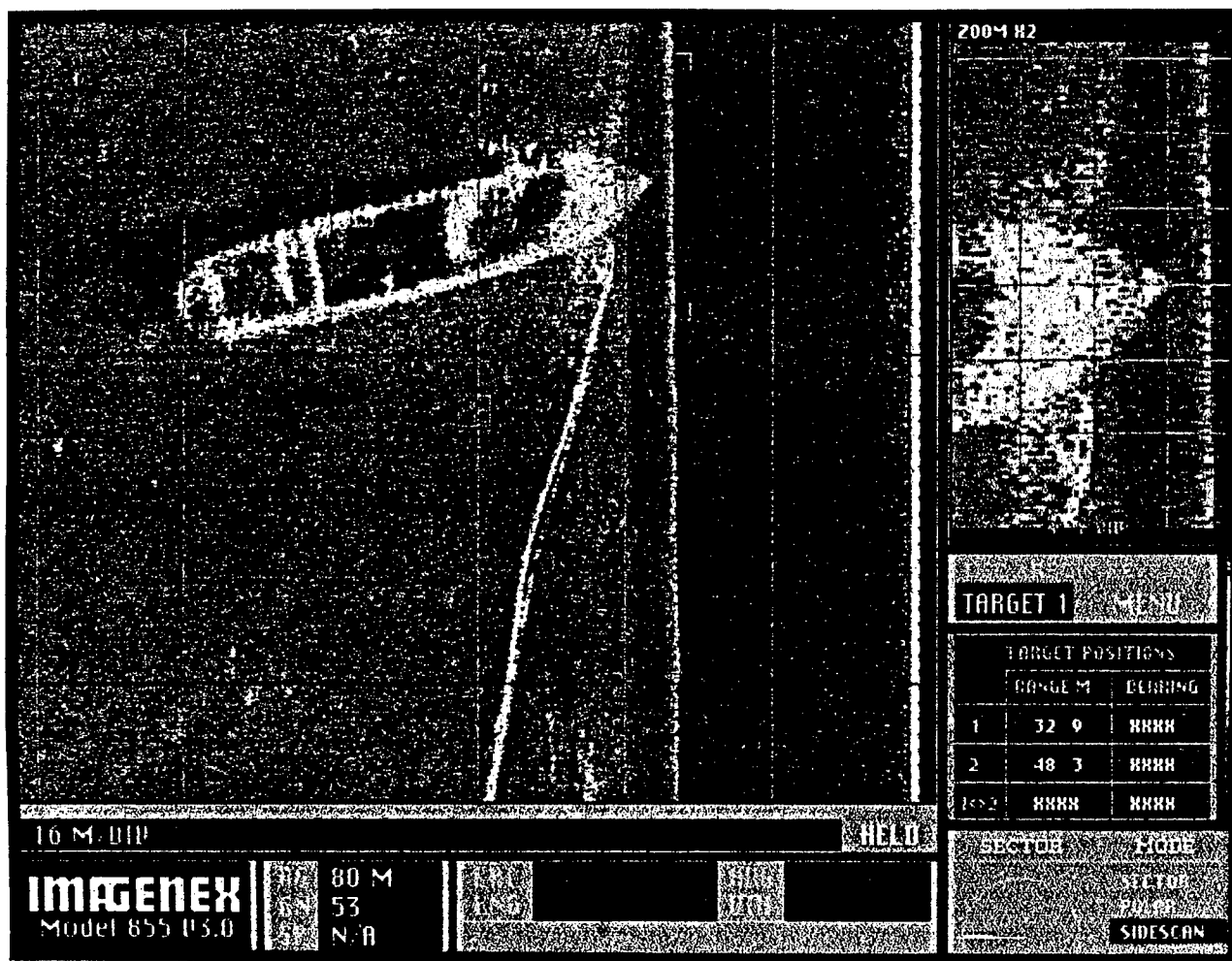


Figure 3. Imagenex 858 side scan sonar image of a submerged boat (courtesy of Imagenex)

water. *Hypack* made this correction by using its harmonic tidal prediction program, with predicted tides input by Goodwin & Associates from tide tables published by the British Admiralty (Hydrographer of the Navy 1995). These corrected readings were converted into a text-based display of depths and plotted on a plan of each survey block (Chapter IV), each of which displays the depths in feet below mean lower low water.

Logistics

The bulk of the Atchafalaya ODMS field investigations were conducted from the 54 ft (16.46 m) aluminum-hulled Breaux's Bay Craft research vessel *Acadiana*, chartered from the Louisiana University Marine Consortium (LUMCON), headquartered in Cocodrie, Louisiana. LUMCON's Captain Craig LeBouef, and his associate First Engineer Samuel LeBeuof served as the ship's crew for the project. The R/V *Acadiana* provided a stable and weatherly platform for conducting survey operations, and had ample facilities, cabin, and deck space for living onboard, for setting up the remote sensing recording stations, and for deploying the magnetometer and side scan sonar sensors. Navigational and data storage equipment, consisting of the DGPS, a laptop computer, a full size computer monitor, the magnetometer recorder, and fathometer monitor were installed inside R/V *Acadiana*'s bridge. The side scan sonar processor was set up in the adjoining main cabin, immediately abaft the bridge. The remote sensing survey technicians wore 2-way radio headsets to facilitate communications between the two recording stations.

Prior to commencing the remote sensing survey, a reconnaissance of the project area was undertaken in R/V *Acadiana* to ascertain water depths and to identify potential obstructions such as gas or oil platforms. In the northernmost portions of the project area (Blocks 4 and 5), NOAA charts depict water depths of 6 - 14 ft (1.8 - 4.3 m) at mean lower low water. The reconnaissance was undertaken at a seasonal high tide on July 3, 1996, because the R/V *Acadiana* draws 5 ft (1.5 m) of water. In a portion of Block 5, depicted on the most recent edition of NOAA chart 11351 (Point au Fer to Marsh Island) as having 8 ft (2.4 m) of water at mean lower low water, *Acadiana* grounded. This suggests a high degree of sedimentation in the area since the soundings used in preparation of the chart were taken in 1935. Based on this initial reconnaissance, it was estimated that at least a 3 to 4 ft decrease in water depth has occurred through this area since 1935, with a slightly smaller decrease in depth at the southern end of the project area. Tidal corrections applied to the bathymetric data during postprocessing yielded a more precise indication of sedimentation rates, as discussed later in this report.

The shallower than expected depths encountered in Block 5, the northernmost segment of the study area, precluded the use of R/V *Acadiana* in that area, because of her 5 ft (1.5 m) draft. LUMCON's R/V *Coli*, a 22 ft (6.7 m) aluminum hulled boat with a forward cabin, therefore was employed for surveying the shallower portions of project area's northern end. R/V *Coli* also was used for conducting the refined surveys of the mini-blocks, where it was easier for the smaller boat to maintain the 50 ft (15.24 m) lane spacing.

On the R/V *Acadiana*, the DGPS beacon receiver and GPS antennae were mounted on the roof of the bridge, approximately 2 ft 6 in (0.76 m) apart from one another and 38 ft (11.58 m) forward of the stern. The GPS antenna was offset 3 ft (0.91 m) to port of the centerline of R/V *Acadiana*'s longitudinal axis; the DGPS antenna was offset 5 ft 6 in (1.67 m) to port. The side scan sonar sensor was deployed from the port side, 15-20 ft (4.57-6.09 m) aft of the GPS antenna. The magnetometer sensor was deployed from *Acadiana*'s stern, offset 5 ft 6 in to starboard, and had a layback of 130-140 ft (39.62-42.67 m) aft of the GPS antenna. The fathometer transducer was deployed from the starboard forward quarter, two ft (0.61 m) forward of the GPS antenna, and offset 9 ft (2.74 m) to starboard from the R/V *Acadiana*'s longitudinal centerline.

On R/V *Coli*, the DGPS beacon receiver and GPS antenna were mounted on the cabin roof, six ft (1.82 m) apart from one another, and 9 ft (2.74 m) forward of the transom. Both were offset 3 ft (0.91 m) from the R/V *Coli*'s longitudinal centerline, with the DGPS antenna on the port side and the GPS antenna on the starboard side. The side scan sonar sensor was deployed from the port aft quarter, 5 - 8 ft (1.52 - 2.43 m) aft of the GPS antenna. The magnetometer was deployed from R/V *Coli*'s stern, and was offset 2 ft 6 in (0.76 m) to port, with a layback of 89 - 129 ft (27.13 m) aft of the GPS antennae. The fathometer transducer was mounted in the stern, 11 ft (3.35 m) aft of the GPS antennae, with an offset of 1 ft 6 in (0.49 m) starboard of the R/V *Coli*'s longitudinal center.

The methodology employed during the survey produced favorable results, and the positioning system and remote sensing equipment performed reliably throughout the project. With the exception of occasional afternoon thundershowers and several unseasonable weather patterns that produced strong, sustained 20-25 mph (32.2 - 40.2 kph) easterly and north-easterly winds, and moderate 3 - 5 ft (0.91 - 1.52 m) seas, the sultry, relatively calm weather conditions that are typical for the northern Gulf of Mexico during the summer months prevailed throughout the survey period. Air temperatures were 90 - 95° F (32.2 - 35.0° C); winds were generally southerly and did not exceed 10 mph (16.1 kph); seas typically were 4 ft (m) or less (1.21 m). Regular and evenly spaced coverage of the project area was achieved.

Remote Sensing Data Analysis

Magnetic and bathymetric data initially were analyzed while they were generated, and field record forms were used to note survey details, obvious anomalies and potential correlations between anomalies. Data were postprocessed by staff at Goodwin & Associates, Inc.'s Frederick, Maryland office, where *Hypack* and *Surfer* computer software applications were used to assess the signature, intensity, duration, and areal extent of individual magnetic and bathymetric disturbances that were recorded and plotted. Sonagrams and bathymetry records from the survey area were analyzed visually and then correlated with the magnetic data using time and positioning information to determine the presence of any relationships between the acoustic, bathymetric, and magnetic anomalies.

Analysis and Identification of Potentially Significant Targets

Magnetic Data. Magnetic data were analyzed for this investigation in two ways. First, individual survey lines were reviewed in *Hypack*'s "Edit" program, which displays magnetic readings on a graph, as well as in a tabular format in which each reading is annotated with time, position, and other data (Figure 4). This review makes it possible to isolate individual anomalies, to characterize them as monopolar, dipolar, or multicomponent, and to measure their duration in time and their amplitude in gammas. In addition, XY coordinates can be obtained for each anomaly. For this survey, each magnetic anomaly was assigned a number, and the relevant information for the anomaly was entered into a table.

The physical relationships between individual anomalies are important from an analytical standpoint, particularly their spatial patterning and proximity to one another (clustering). These relationships are more easily seen when anomalies are plotted across the survey area in a plan view. This was accomplished in two ways: 1) with plots of individual anomaly center points; and 2) by contouring the magnetic data. The first method simply provides spatial relationships, allowing the researcher to see linear or other patterns which might be indicative of a pipeline or the clustering typical of a shipwreck's debris field. Contouring, on the other hand, combines these spatial relationships with information on the relative strength or amplitude of anomalies. Although contouring provides a convenient way to present magnetic data, it must be recognized that it is

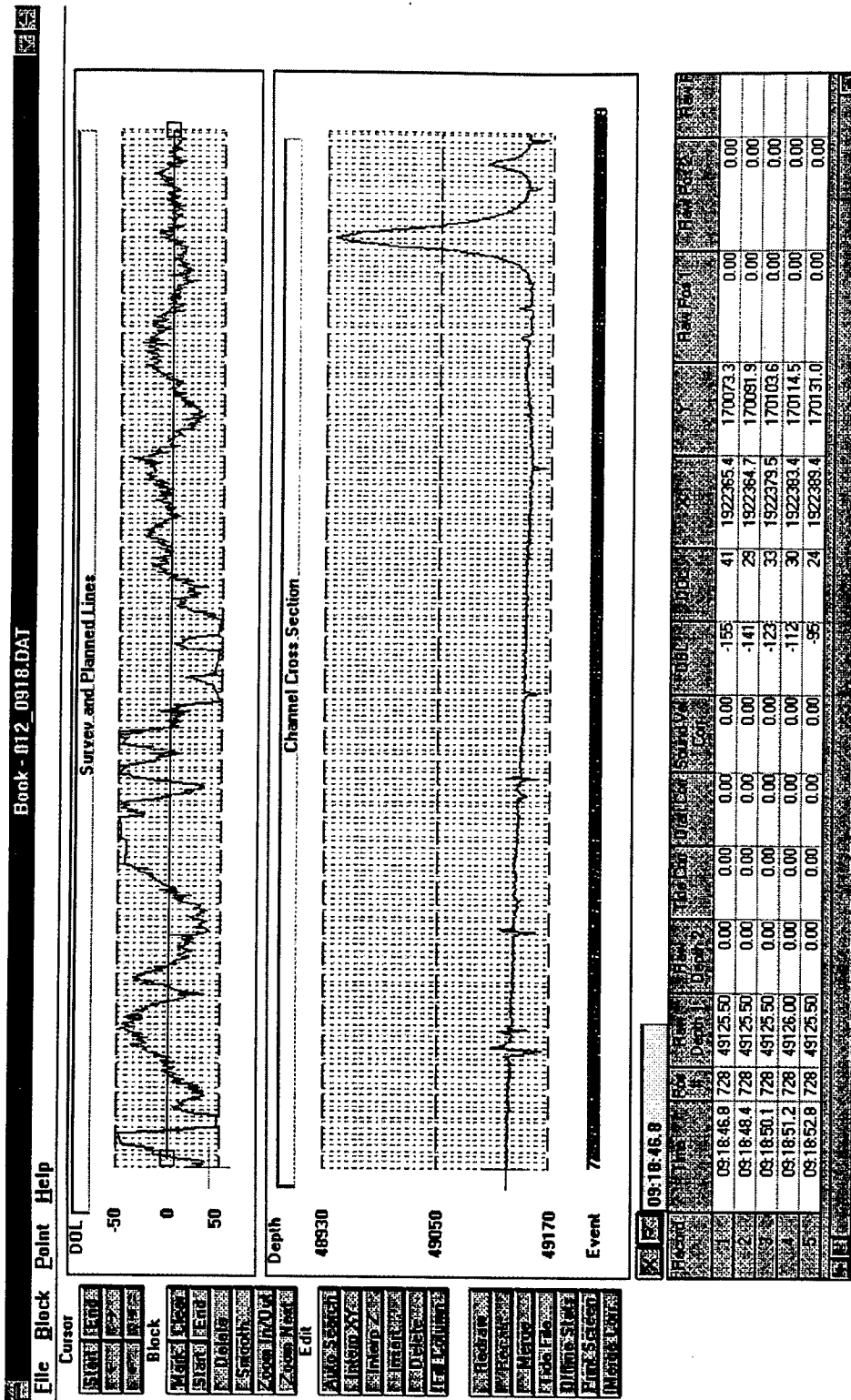


Figure 4. Screen from Hypack's "Edit" program, showing course track (top graph), magnetometer profile (lower graph), and tabular data (at bottom of image)

most useful on surveys with a close lane spacing of 30-35 ft (10 m), where the sensor is close to the target and individual anomalies are clear (Murphy 1993:380). Although contour maps are provided here, greater analytical emphasis was placed on the individual lane records read in the "Edit" program of *Hypack's* processing software. Because this study does utilize contour maps, albeit cautiously, and because contours can be constructed in a variety of ways, with different implications for analysis, a discussion of the contouring methods utilized in this study may be useful.

Contouring of Magnetic Data. Several steps were necessary for processing and plotting the magnetic data. The data collected was first converted by *Hypack* to a data file of X,Y and Z values, where X,Y represented the location in Louisiana State Plane coordinates, and the Z value represented the recorded field strength value in gammas. An attempt was made to make an isobar plot of these values using Golden Software's *Surfer Version 5.0*, but the density of the data points made the plot unreadable. In addition, some correction for diurnal variation in ambient field strength was necessary, particularly given the long duration of the survey. Diurnal variation refers to the normal shift in field strength at any given point over the course of a day (in the mid-south and mid-north latitudes, strength will decrease in the morning and rise toward the end of the day). This normal shift can range in the tens of gammas and is in addition to even larger variations which are induced by sunspot activity (Weymouth 1986:346). Shifts of this magnitude over the course of a day and over the course of a survey clearly can have a skewing effect on the magnetometer data, especially if the data is to be contoured for analysis.

Perhaps the most common method of correcting for diurnal variation is to periodically return to a single reference point for control readings over the course of the survey or to use a control sensor which continually measures field strength at that fixed spot. These control or reference readings can be "...plotted against time, and the shifts from a fixed value are used to correct the grid-point readings" (Weymouth 1986:346). This allows the analyst to correct for diurnal fluctuation over time and plot full-field strength readings which are comparable across the survey area. This can be a time-consuming and cumbersome process however, particularly on a survey of any size.

A different approach to correcting for diurnal variation was used in this survey. The approach is based on the understanding that *absolute* full-field strength is not the salient issue for marine archeologists, but rather the *difference* between magnetic readings from point to point, unskewed by diurnal variation, is the critical factor in isolating potential submerged cultural resources. In this approach, therefore, what is plotted is the difference between each magnetometer reading and the reading that immediately preceded it. Because readings are recorded every two or three seconds, the differences (or gradients) between them result from the real shift in magnetic field strength due to the proximity of ferrous materials or other features, rather than from diurnal shift, which occurs much more slowly.

The magnetic data from this survey therefore was filtered to record the change in field strength from point to point, resulting in a gradient-based plot of the magnetic field strength. By this method it was possible to display all variation within the recorded magnetic field at a scale of 3 gammas or better. To create the filter, a simple program was written in Microsoft *Qbasic* to convert the Z (gamma) full field values into a gradient value data set by subtracting each magnetic reading on a given survey line from the magnetic reading immediately preceding it. The result is a gradient between successive data points. These gradient data then were transferred into *Surfer*, which interpolated isogamma contour lines based upon the inverse distance to a power method. The inverse distance to a power method tends to generate more accurate results from data sets where data is collected at a regular interval, as opposed to "kriging" which is best suited to interpolating data from random or non-linear collection methods. The data that were interpolated tended to vary a great deal in field strength, especially where modern features such as pipelines were encountered. In these instances, gradients shifted very rapidly over a short distance, and this resulted in contour lines that occasionally were extremely dense and difficult to read. To avoid this,

the isogamma contour plots were subdivided, with positive and negative gradient values from 3 to 48 gammas contoured at an interval of 3 gammas, while variation from 50 to 1000 gammas was contoured at a 50 gamma interval. Even so, the isogamma lines became quite dense at these higher scales, so each anomaly was individually labeled for further clarity.

For the resurvey blocks, diurnal variation was not as much of a problem, as the blocks were much smaller in scale and quickly surveyed. The magnetic data collected was converted to *Surfer* format, and plotted using full-field strength, at a variable contour interval so that the maximum amount of detail could be displayed for each of the resurvey blocks. Once again the "inverse distance to a power" method was used for generating the isogamma plots.

Anomaly Clusters. Given the 160 ft (48.78 m) lane spacing specified by this survey's Scope of Work, the model developed by other researchers for assessing the signatures produced by 164 ft (50 m) survey intervals was used (Clausen 1996; Arnold 1982; Garrison et al. 1989; as cited by Irion et al. 1992). This model suggests that magnetic signatures of potential submerged cultural resources may be distinguished from signatures produced by modern debris when three or more anomalies are clustered in a 50,000 sq m (535,265 sq ft) area surveyed using that interval. Clusters of magnetic anomalies falling into these parameters therefore received closer attention and designation as potentially significant. The designation of individual clusters and the assignment of individual anomalies to those clusters was based both on the distribution plots of anomaly center points and upon the magnetic profiles graphed in *Hypack*. In some instances, pairs of anomalies were subjected to similar scrutiny.

Acoustic Anomalies. Sonar images were examined on a computer screen using the Imagenex processor to play back images. The processor allows the analyst to quickly review data by scrolling along the survey line, using several different color schemes, depending upon which is the most informative (gray, reverse gray, color, etc.). When a target is seen, the image can be stopped and a zoom function allows the analyst to focus in on the target and view it in greater detail (Figure 3). A cursor allows measurement of the target and a determination of the distance between the target and the sonar sensor. This distance between target and sensor is along a diagonal (the sensor is near the water surface, while the target is on or near the bottom), rather than along a horizontal plane, but slant range corrections may be applied to achieve true horizontal range. The formula presented by Green (1990:50) was used for this study, wherein the true horizontal range (R) is calculated as the square root of the slope distance (D) squared, minus the height of the sensor above the bottom (H) squared, or $R^2 = D^2 - H^2$. Slant range error is greater in deeper water. Using this formula, error even in the deeper sections of the survey area (20 ft [6.10 m]), with the sonar transducer three ft (0.91 m) below the surface, is quite small, less than one ft (0.30 m) at extreme range and less than three ft (0.91 m) at a shorter range such as 50 ft (15.24 m). In shallower depths of 10 ft (3.05 m), the error is less than 0.02 ft (0.61 cm) at extreme range.

Images were examined and characterized as to identity wherever possible; some were clearly trawl scars or tidal scours, while other targets were recognizable as pipe, cable, or other debris. Modern or natural targets such as these were inventoried, but removed from further consideration. Potentially significant targets were analyzed and tabulated, and correlations between the acoustic targets and other data sets were sought. Although intact shipwreck structure is relatively easy to identify on sonagrams, scattered and broken debris can be harder to identify, so all potential targets were noted. Images of potentially significant targets were captured and transported to other graphics programs for enhancement, analysis or printing.

Bathymetric Data. Bathymetric data was examined in *Hypack's* "Edit" program, which displays depth readings on a graph, as well as in a tabular format in which each reading is annotated with time, position, and other data. This review makes it possible to isolate individual

anomalies and to characterize them. As noted earlier, these data primarily were used for two purposes: first, they were correlated with magnetic and sonar data to provide additional information on already identified targets; second, they provide detailed information on depths in the project area, allowing an assessment of sedimentation rates.

Assessment Archeological Potential

Clusters of magnetic, acoustic, and bathymetric anomalies are of particular importance in assessing the archeological potential of anomalies. There are no reliable means, using current technology, to distinguish between shipwreck debris and modern debris based on the magnetic signature or appearance of a single, individual anomaly. Although modern debris occasionally will be deposited in groups or clusters of objects, shipwrecks seldom result in the deposition of a single, isolated ferrous object. Single anomalies therefore are assumed to have a lower probability of representing a wreck, while clusters are correspondingly more likely to result from such a feature. Analysis therefore focuses less upon isolates, especially in a large survey such as this, and places greater weight on clusters of anomalies.

The archeological potential of the clusters themselves may be evaluated based on the number and density of individual anomalies within the cluster (larger numbers and higher density suggest greater potential); anomaly amplitude (very small gamma variations are less likely to be large objects such as cannon, anchors, etc.); and duration (short duration suggests isolated trash, while longer duration anomalies hold greater potential). Following works cited earlier in this report, a cluster was taken as three or more similar anomalies falling within an area of approximately 535,265 sq ft (50,000 sq m), or the equivalent of a square measuring 731.6 ft (223 m) on a side. These dimensions occasionally were adjusted to encompass similar and immediately adjacent anomalies. Anomaly amplitude was assessed as follows: variations of 20 gammas or less were classified as low amplitude; variations above 20 gammas up to 70 gammas were designated as moderate in amplitude; and variations above 70 gammas were classified as strong. Deflections lasting less than 10 seconds (or for a length of 50 ft [15.24 m] along the survey line) were designated as short; a duration of between 10 seconds and 30 seconds (a length of between 50 ft [15.24 m] and 151.8 ft [46.2 m]) was moderate; and anything above 30 seconds was classified as long duration.

The combination of these attributes were used to evaluate the anomalies within each cluster as a group. In general, a group of anomalies that were of moderate to high amplitude and moderate to high duration were considered to have greater potential. This assessment may be tempered, however, by the knowledge that some extremely long duration, high amplitude anomalies may be produced by the survey vessel passing over a cable or pipeline. In these cases, assessment also is informed through an examination of other anomalies in the vicinity of the cluster. A linear pattern of adjacent anomalies would suggest a high likelihood that the anomalies result from a pipeline or cable and a correspondingly lower likelihood of archeological significance. Overall assessment of a cluster's potential also utilizes data from bathymetry and sonar. An magnetic anomaly that is of moderate to high amplitude and duration might, for example, be categorized as holding high potential until examination of the accompanying sonar images reveals a pipe or cable-like object as the source. The evaluation of the anomaly is then changed to reflect the low probability that it is of archeological interest. Given the wide variety of factors that contribute to an assessment of archeological potential, no hard and fast rules for rating anomalies is possible or even advisable.

Delineation of Areas for Resurvey

The much larger than anticipated number of anomalies encountered during the initial survey (discussed in detail in Chapter IV) made it impossible to conduct detailed, close interval survey over every anomaly as called for in the Scope of Work. In practice, this would have necessitated a resurvey of most of the project area. In consultation with USACE-NOD, an alternative strategy was developed in which the most promising individual anomalies or clusters of anomalies were identified. Resurvey blocks then were laid out around a sample of these in such a way that a large number of anomalies could be reexamined.

Ultimately, a total of seventeen blocks, consisting of three 700 ft (213.36 m) sq blocks, thirteen 600 ft (182.88 m) sq blocks, and one 300 ft (91.44 m) sq block, were resurveyed. One of the blocks (Resurvey Block 5-D) was placed in an area where no anomalies had been detected during the initial survey. This block was intended as a control to assess the degree to which the large lane spacing used in the initial survey might have bypassed low amplitude magnetic anomalies. Blocks were distributed across the entire survey area, so that a sample was obtained from each of the five blocks.

CHAPTER IV

RESULTS OF INVESTIGATIONS

Archival Results

Historical Research

As stipulated in the Scope of Work for this project, no research was conducted in primary documents. Secondary sources were used instead, due to the comprehensive background research carried out for other studies in the region. The results of this review of secondary sources have been presented in Chapter II of this report, which establishes the natural and historical contexts of the project area. The search for relevant secondary sources also included reports on previous investigations in the area.

Previous Investigations

Previous investigations within the bounds of the project area or immediately adjacent to it are limited to two studies. In 1981, a survey was carried out in advance of construction of a 10 in pipeline in the area (McIntire 1981). The line was to run from offshore in Eugene Island Area Block 18, across the mouth of the Atchafalaya Channel and the Point au Fer Shell Reef, then northeast across the Atchafalaya Bay to a landfall at Palmetto Bayou and thence on to a terminus at Gibson, Louisiana. Louisiana state site files recorded the presence of a prehistoric beach deposit, Site 16TR36, near the Palmetto Bayou Landfall. Field investigations in advance of the new pipeline concluded that the site had been lost due to shoreline erosion. No other cultural resources were identified by the study.

More recently, it was reported by locals that historic materials were being eroded from the Point au Fer Shell Reef area, immediately adjacent to the shipping channel's entrance into Atchafalaya Bay (Pearson 1992). The informants believed that the remains were those of a treasure vault associated with Jean Lafitte. Field investigations by archeologists determined that the features were part of the site of the 1827-1858 Point au Fer lighthouse. The most prominent features included a square palisade measuring roughly 220 ft (67.07 m) on a side and made of split-plank cypress. Inside and partly overlapping this palisade was an oval palisade measuring 225 ft (68.60 m) by 175 ft (53.35 m) (Pearson 1992:4). Within these enclosures, exposed brick footings, logs, and a foundation for the lighthouse were visible, including brick piers and brick vaulting. The site apparently was covered with sand and mud until about 1983, when the overburden eroded and the remains were exposed and became visible at low tide (Pearson 1992). As a result of the investigations, the site was designated 16TR257 and recorded in the state's inventory of archeological sites. The site is not within the current project area, nor is it threatened by this undertaking.

A review of files at the Department of Interior's Minerals Management Service (MMS) revealed no known shipwrecks or sites in the offshore lease blocks of the project area. Contact with the National Oceanic and Atmospheric Administration's (NOAA) Automated Wreck and Obstruction Information System (AWOIS) program (Steve Verry, personal communication, 31 October 1996), disclosed that no shipwrecks are listed within the project area (between 29° 20' 59.92" N / 91° 23' 33.23"W and 29° 07' 59.43" N / 91° 34' 27.51" W).

Archeological Results

The following discussion presents the results from the both the initial and refined remote sensing surveys. Results from the initial survey are presented first, in a general overview, followed by a narrative description of each survey block. These descriptions are accompanied by inventory tables in the report's appendices, which contain detailed data for individual acoustic (Appendix II), bathymetric (Appendix III), and magnetic (Appendix IV) anomalies recorded during the initial survey. Results from the resurvey of smaller, selected areas within the initial survey blocks are then presented in the same format, with narrative descriptions in the text and tables in the appendices (Appendices V-VII).

General Overview of the Initial Survey Results

Magnetic Anomalies. A total of 1,000 magnetic anomalies was recorded during the initial survey of Blocks 1-5 (Appendix IV). The location of magnetic anomalies is shown on two fold out sets of plot maps, the first showing center points for individual anomalies, and the second set showing isogamma contours of anomalies. These figures are found accompanying the relevant discussions in the text. More generalized locations of magnetic anomalies, without anomaly numbers attached, are shown in Figures 5 - 9. The magnetic anomalies were distributed between the blocks as follows:

Block 1 - 61 anomalies;
Block 2 - 142 anomalies;
Block 3 - 403 anomalies;
Block 4 - 252 anomalies;
Block 5 - 142 anomalies.

Within the magnetic data, many of the recorded anomalies clearly were caused by recent intrusions related to the development of the offshore petroleum industry. For example, magnetic disturbances, some of which measured in excess of 1,000 gammas, were observed on several occasions when the magnetometer passed near gas or oil platforms. Similar disturbances were noted in close proximity to the charted locations of pipelines and cables in the study area. In some cases, these disturbances extended over long distances, measuring from several thousand feet to more than a mile. It is important to recognize that the great strength and duration of these disturbances can effectively mask smaller magnetic anomalies caused by potential submerged cultural resources, and this masking further complicates interpretation of the magnetic data. It was, however, possible to screen out some scattered, low amplitude anomalies, and isolated, brief, high amplitude signatures that were likely to have been caused by debris associated with oilfield activity.

Obvious concentrations of magnetic disturbances that are related to submerged pipelines are clearly visible in the plot maps of magnetic anomalies, especially the contour maps of magnetic gradients (see below). For instance, there is a linear array of anomalies (magnetic anomalies 1, 2, 3, 5, 7, 10, 11, 12, and 19) in the northwest corner of Block 1, that clearly appears to be caused by a pipeline. Additional magnetic disturbances were recorded around a platform just to the southeast of this line (magnetic anomalies 25, 40, 47, and 51). In Block 2, three linear patterns of anomalies may be seen radiating out from an oil platform just south of the center of the block. To the south of the rig is one line of anomalies (magnetic anomalies 152, 160, 168, 175, 184, 189, 194, and 203). To the north is a second line (magnetic anomalies 132, 120, 110, 100, 88, 83, 68, and 62), while a third line runs east-northeast of the platform (magnetic anomalies 169, 176, 185, 190, and 196). In Block 4, a similarly obvious line of 14 targets can be seen crossing the center of the block from west to east (magnetic anomalies 648, 716, 732, 740, 764, 775, 791, 802, 807, 814, 826, 829, 840, and 852). Block 3, on the other hand, is so densely covered with anomalies that no patterns

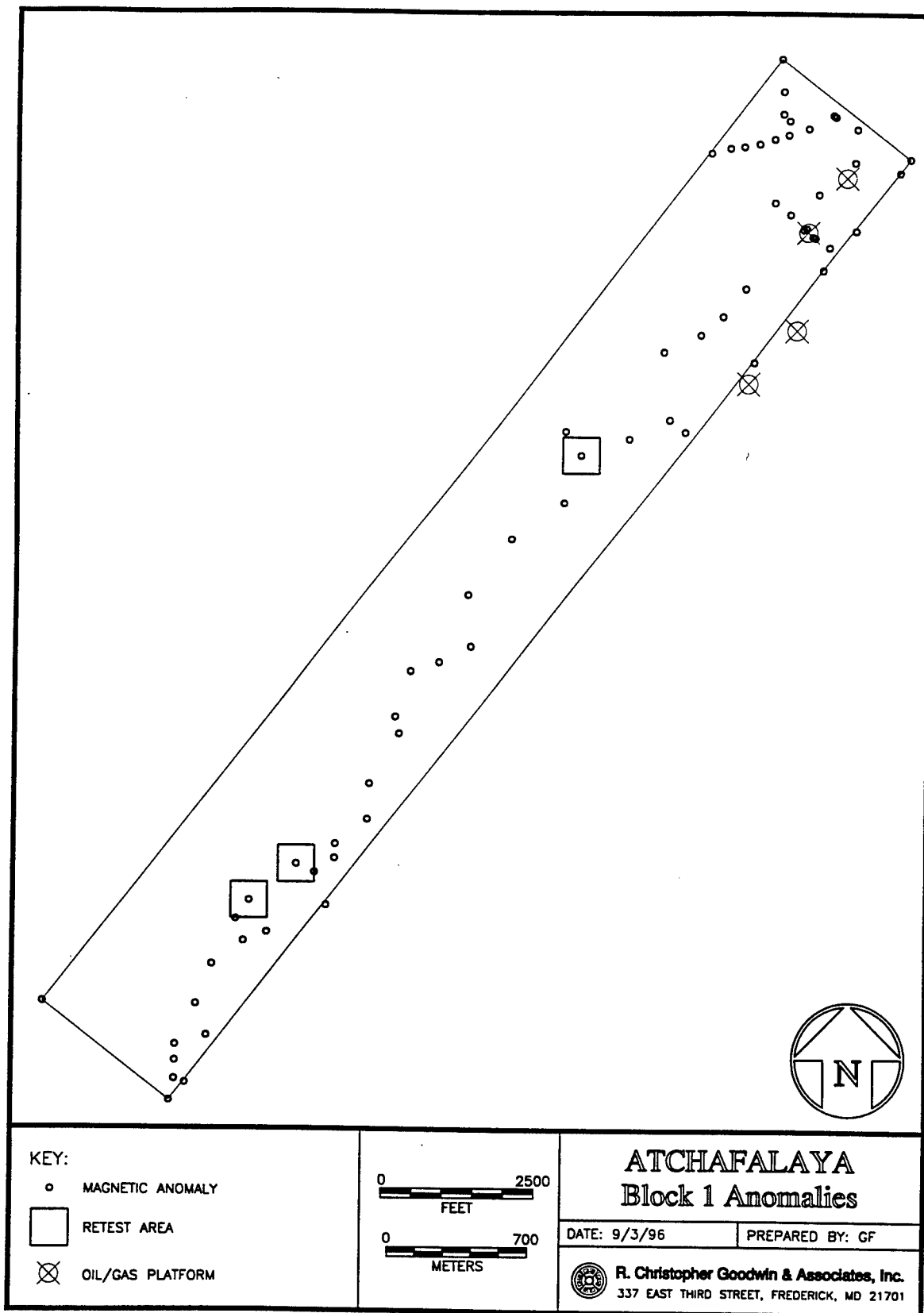


Figure 5. Magnetic anomalies located in Block 1

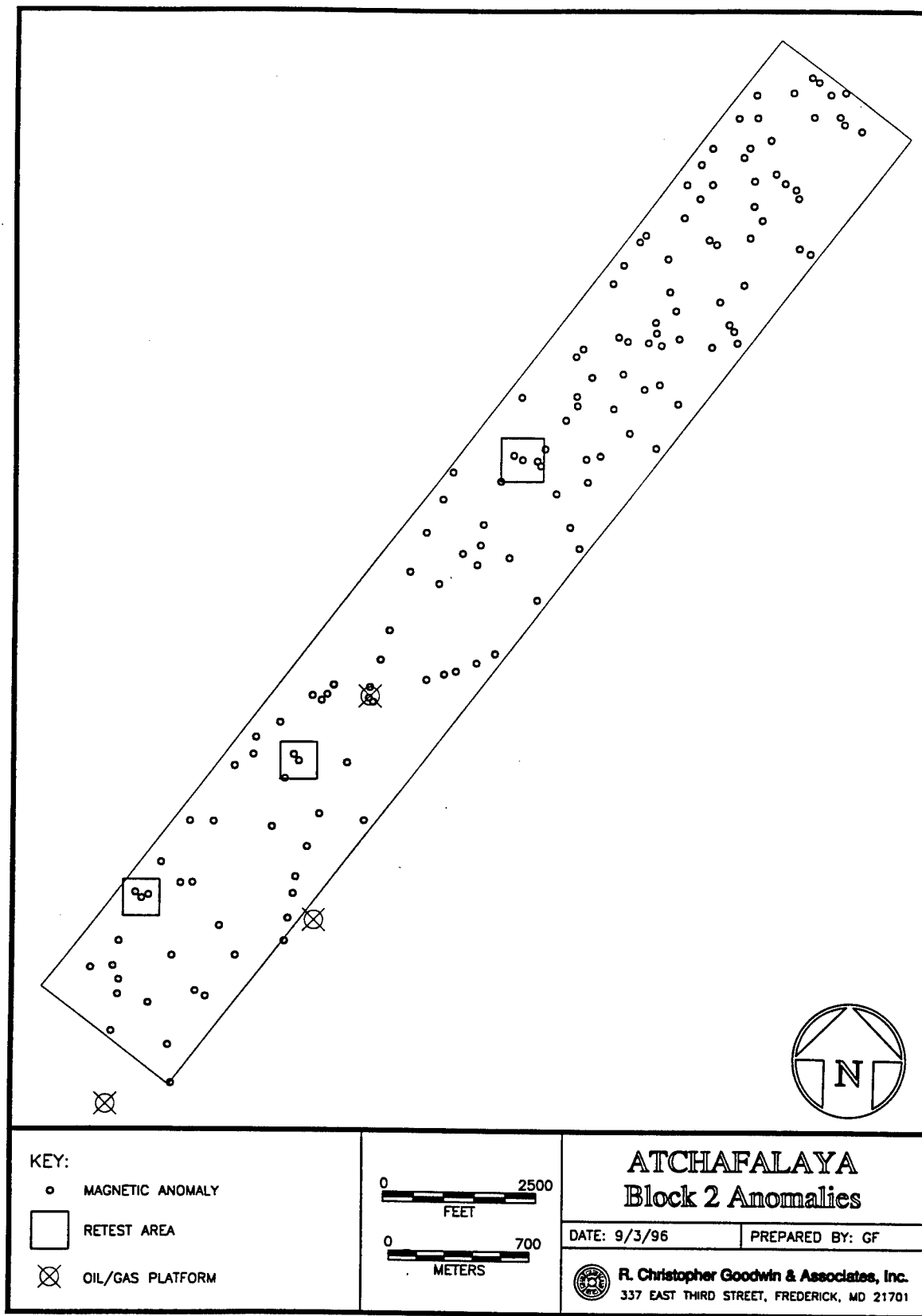


Figure 6. Magnetic anomalies located in Block 2

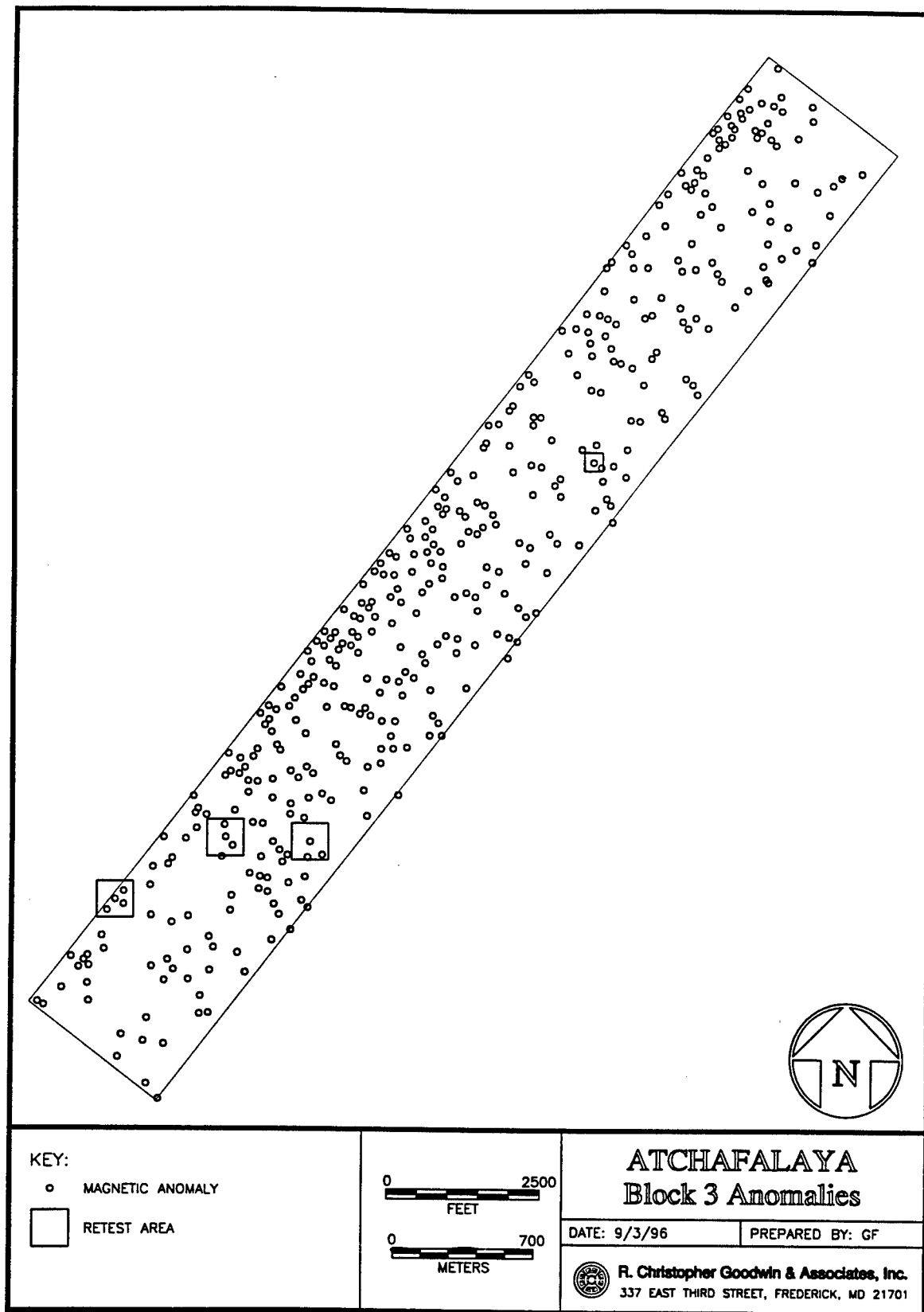


Figure 7. Magnetic anomalies located in Block 3

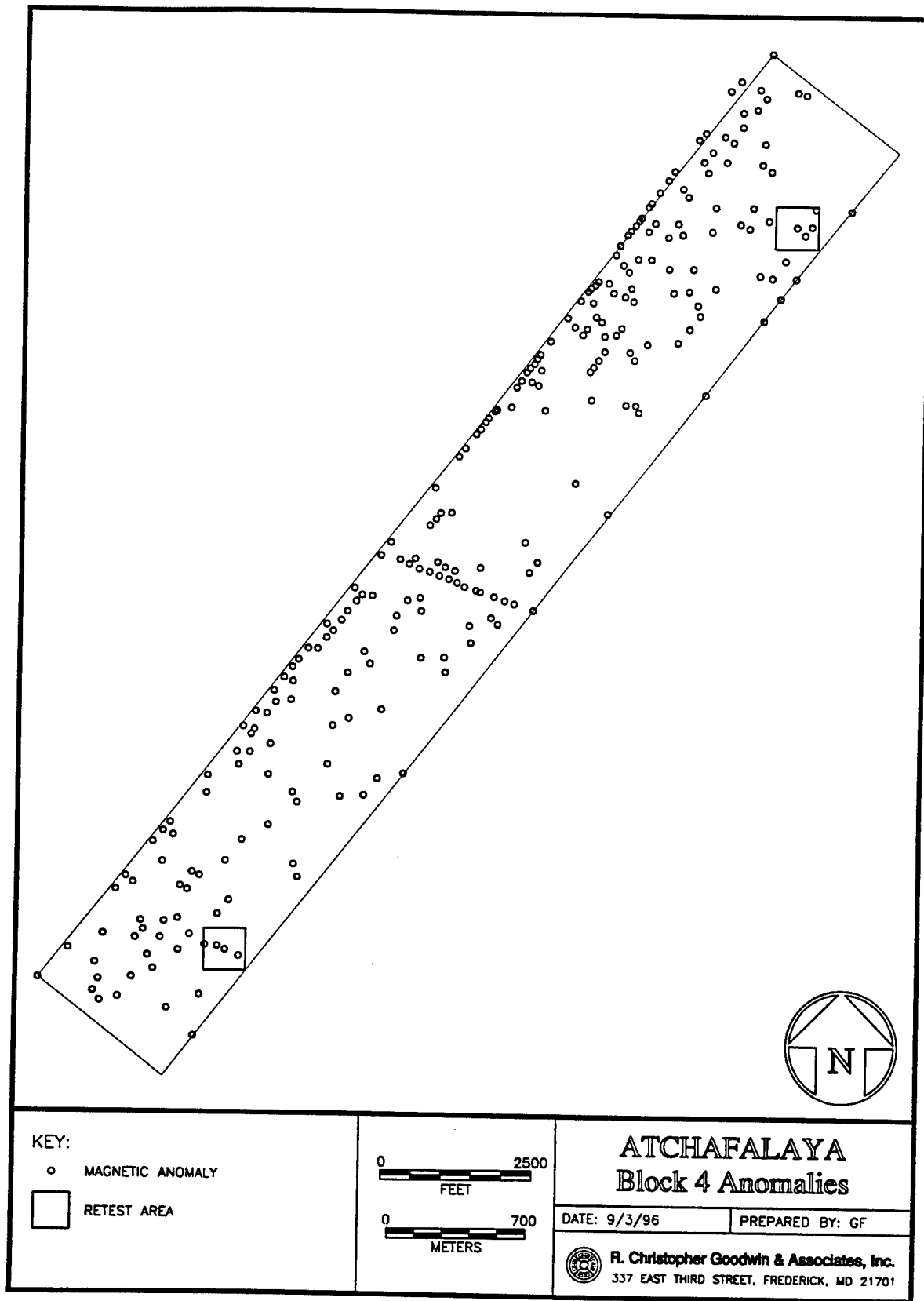


Figure 8. Magnetic anomalies located in Block 4

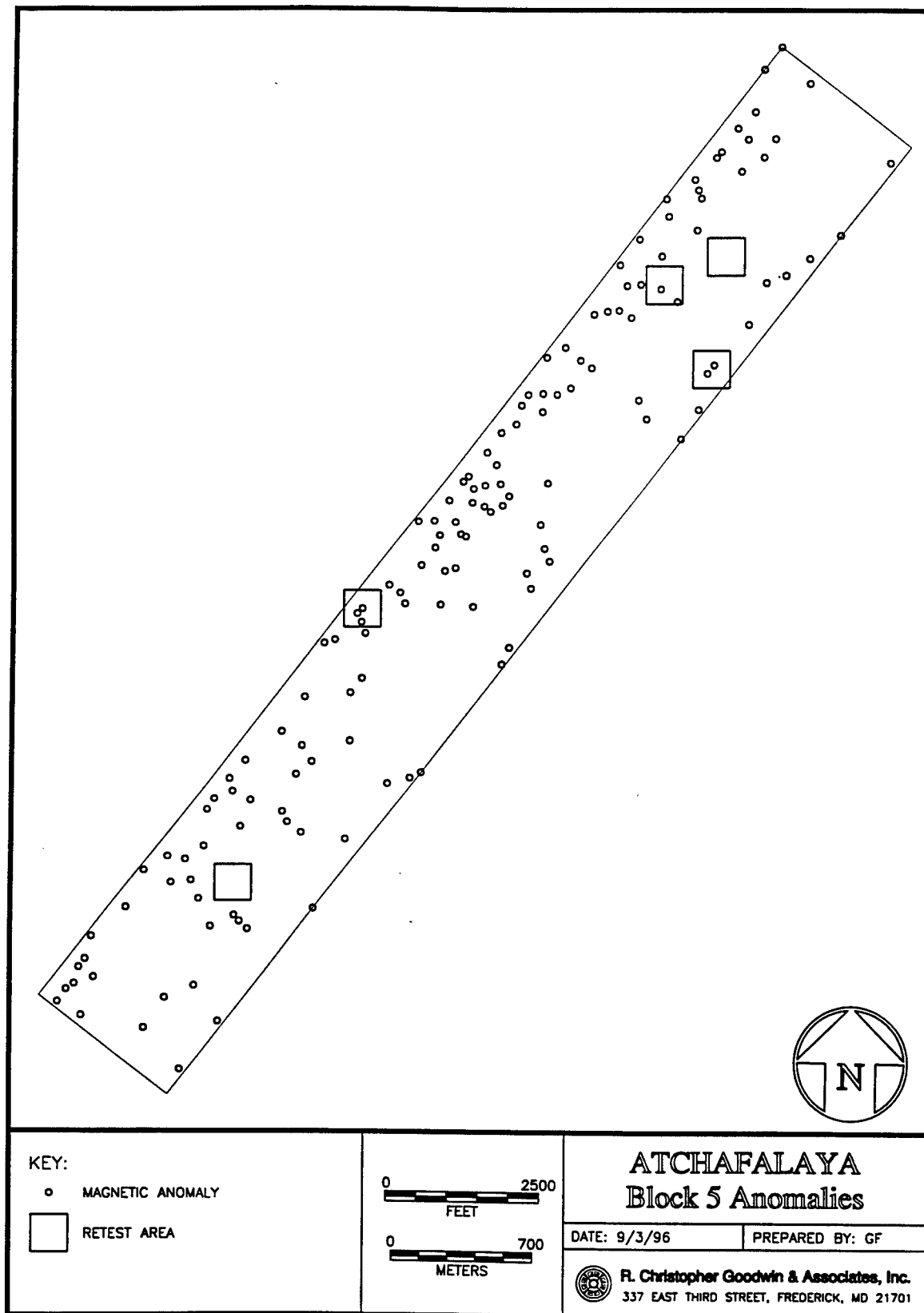


Figure 9. Magnetic anomalies located in Block 5

are immediately obvious, although there is one concentration of anomalies along the west edge of Block 3 that follows a pattern that is repeated in Blocks 4 and 5. This may indicate the presence of one or more pipelines running down the western edge of the project area. Alternatively, because of its closer proximity to the Atchafalaya shipping channel, the concentration of anomalies along the western edge of Survey Block 3 may be the result of years of accumulated modern debris from shipping activities, and/or the deposition of dredge spoil from earlier dredging operations, which probably included some ferrous debris that accumulated in the channel over the years.

In the discussions that follow, magnetic anomalies are described according to total variation for the ambient magnetic field in gammas. Magnetic anomalies also are described in terms of their patterns, with a distinction between multicomponent patterns, dipolar deflections, and positive or negative monopolar deflections. For brevity's sake, abbreviations sometimes are used, with "M" standing for multicomponent anomalies and "D" designating dipolar anomalies. Monopolar anomalies are identified by a plus or minus sign immediately following the gamma reading (e.g. 180+ gammas refers to a positive monopolar deflection of 180 gammas, while 300- would denote a negative monopolar deflection of 300 gammas).

Acoustic Anomalies. A total of 165 acoustic anomalies were detected during the general side scan sonar survey of the study area (Appendix II). Block 1 yielded 45 anomalies, while 96 targets were identified in Block 2, seven in Block 3, 17 in Block 4, and four anomalies in Block 5. Several trends are evident from a review of the side scan images. Fewer anomalies are visible in the northern part of the project area, where higher sedimentation rates seem likely. To the south, many more acoustic anomalies are visible. Many images clearly indicate that the targets are pipeline or platform debris, and a comparison of magnetic anomaly locations with sonar target positions suggests a relatively high correlation of acoustic targets with magnetic patterns suggestive of pipeline or cable alignments. Oil and gas development is more prevalent in the southern portions of the study area, and this is probably the primary reason for the greater number of acoustic anomalies seen in that vicinity. In general, the high sedimentation rates in the study area seem to have reduced the effectiveness of sonar in detecting potentially significant cultural resources, particularly those from older periods. More readily detected are modern intrusions, particularly those associated with oil field activity and modern targets such as trawl scars. The sonar is helpful in removing these from further consideration. Because of the highly variable size and shape of sonar targets, plots of target locations can be misleading; they have not been plotted on maps for the discussions below. Centerpoint locations and other data are included in the acoustic inventory (Appendix II), and significant targets are located relative to magnetic anomalies in the text.

Bathymetric Anomalies. A total of 119 bathymetric anomalies were detected during the initial survey of the study area (Appendix III): 1 in Block 1; 10 in Block 2; 36 in Block 3; 37 in Block 4; and 35 in Block 5. Some of the anomalies appear to represent discrete mounds or peaks on the gulf floor, while the bulk of anomalous bathymetric events reflect depressions on the bottom. In several areas, trench-like features, possibly associated with pipelines or cables, also were detected. One of the greatest benefits of having bathymetric data for the study area is that it allows for a comparison of the 1935 soundings (which appear on present charts) and the current water depths; this permits an assessment of the rate of progradation in the project area, an essential component in evaluating site context and environment. The density of bathymetric readings precludes the plotting of individual readings, so the bathymetric plot maps that accompany the discussion plot readings every 100 ft (30.49 m).

Anomaly Numbering System. As survey data were reviewed and anomalies were identified, each anomaly was given a number, and a separate series of anomaly numbers was assigned for each instrument (magnetometer, sonar, and fathometer). Anomaly numbers for magnetic targets were preceded by the designation "M" (for magnetic) to differentiate them from other features. The resulting series of magnetic anomalies runs from anomaly M1 through M1000. Anomaly numbers

for sonar targets were designated as the "A" series (acoustic), running from A1 through A169, and fathometer anomalies were listed in the "B" series (bathymetric), running from B1 through B119.

An analytical effort also was made to identify clusters of magnetic anomalies, targets that appeared in close proximity to one another on the same or adjacent survey lines. Clusters of anomalies, groups of several anomalies lying within a 535,265 sq ft (50,000 sq m) area, are viewed as particularly important, as they are more likely to result from a relatively intact wreck or debris field (see Chapter III). As noted previously, the extant literature provides no reliable means of examining a single magnetic anomaly and distinguishing between modern ferrous trash and shipwreck debris based solely on the anomaly's signature or appearance. Definitive identification of individual anomalies therefore is impossible, and assessment of clustered anomalies is more informative. Clusters of magnetic anomalies were numbered, with a separate series of numbers for each individual survey block. The numbers of clusters within Block 1 therefore are preceded by the designator "C1" and run from C1-1 through C1-2. Block 2 clusters are preceded by the designator "C2", Block 3 by "C3", and so on. Anomalies that cluster together but clearly derive from modern sources were not given cluster numbers and were excluded from further analysis. Anomaly clusters are listed in Table 1, which itemizes each cluster's component anomalies and also summarizes cultural resource potential.

Results of Block 1 Initial Survey Data Analysis

Block 1 contained a total of 61 magnetic anomalies, 45 sonar or acoustic anomalies, and one bathymetric anomaly (Figures 10 - 12). Analysis of these anomalies revealed that 22 of the acoustic anomalies correlated with the magnetic anomalies. There were no correlations between magnetic and bathymetric data sets or between the acoustic and bathymetric data sets. There also were no anomalies that occurred in all three data sets. Analysis of the magnetic data revealed two clusters of magnetic anomalies (Figure 13) and a pair of anomalies that were associated with a petroleum platform.

Cluster 1-1. Cluster 1-1 contains four relatively widely spaced magnetic anomalies: M20, M21, M38, and M43. All of these targets produced low amplitude disturbances (9.0, 12.0, 13.5, and 13.0 gammas) of moderate to long duration (13.7, 12.0, 45.0, and 10.4 seconds), and had varying signatures (i.e. monopolar, dipolar, and multicomponent). No acoustic or bathymetric anomalies were recorded in this cluster. The low amplitude of the magnetic anomalies indicates that Cluster 1-1 has a low probability of being a potential cultural resource, and the absence of sonar or bathymetric evidence indicates that the sources are small and/or buried beneath bottom sediments.

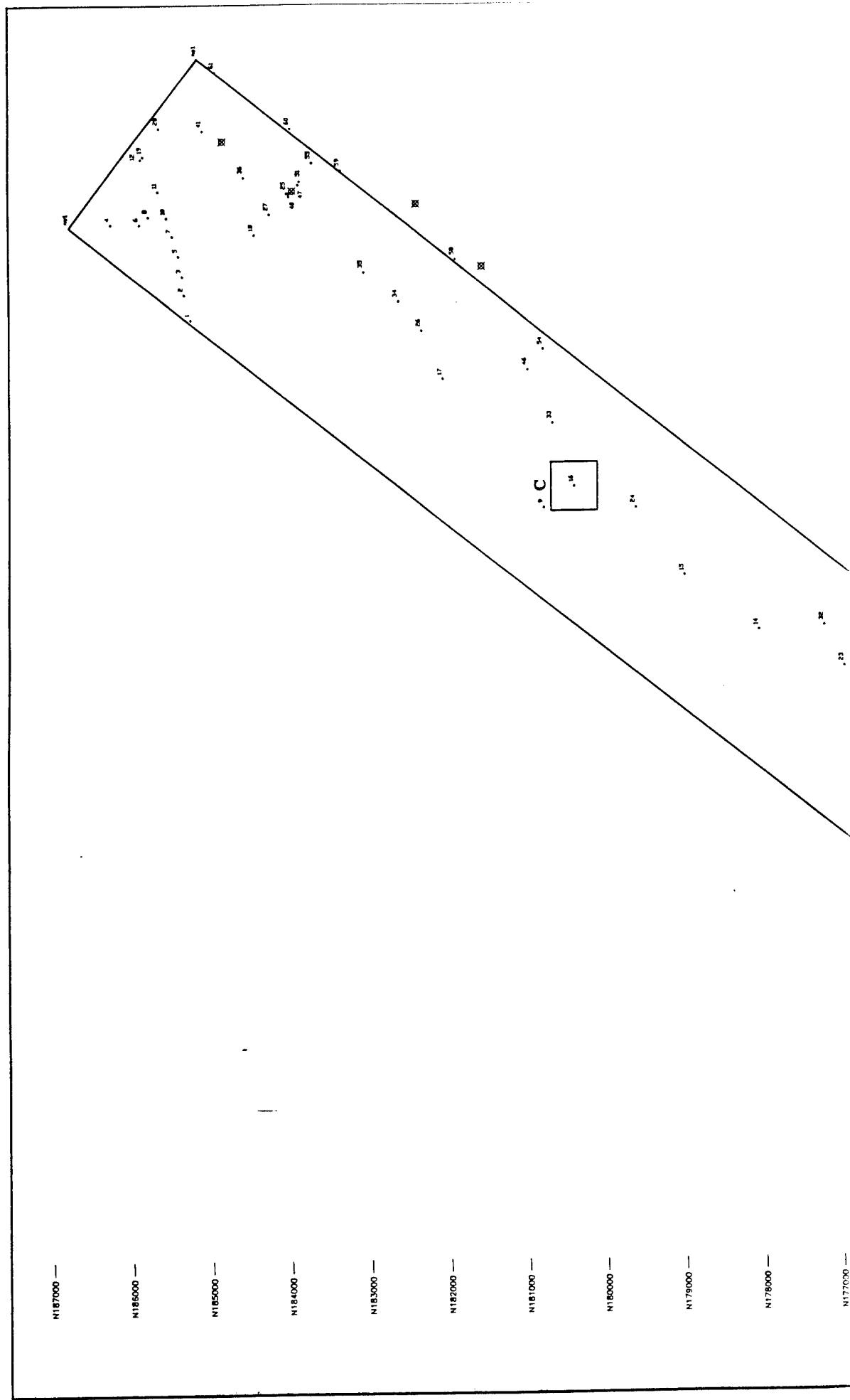
Cluster 1-2. Cluster 1-2 is comprised of one acoustic and four magnetic anomalies: A35, M42, M48, M52, and M56. Anomalies M42 and M56 are moderate amplitude (38.5 and 67.0 gammas), multi-component anomalies with long durations (67.0 and 76.8 seconds). Anomaly M52 is a low amplitude (12.0 gammas) monopolar anomaly with a short duration (6.0 seconds). Anomaly M48 is a moderate amplitude (38.0 gammas) monopolar anomaly of moderate duration (12.0 seconds) with a correlating acoustic anomaly (A35). Acoustic anomaly A35 consists of a linear feature that is oriented across the centerline of the side scan survey record. The probability that Cluster 1-2 represents a significant cultural resource is low, with the acoustic and magnetic signatures suggesting modern debris.

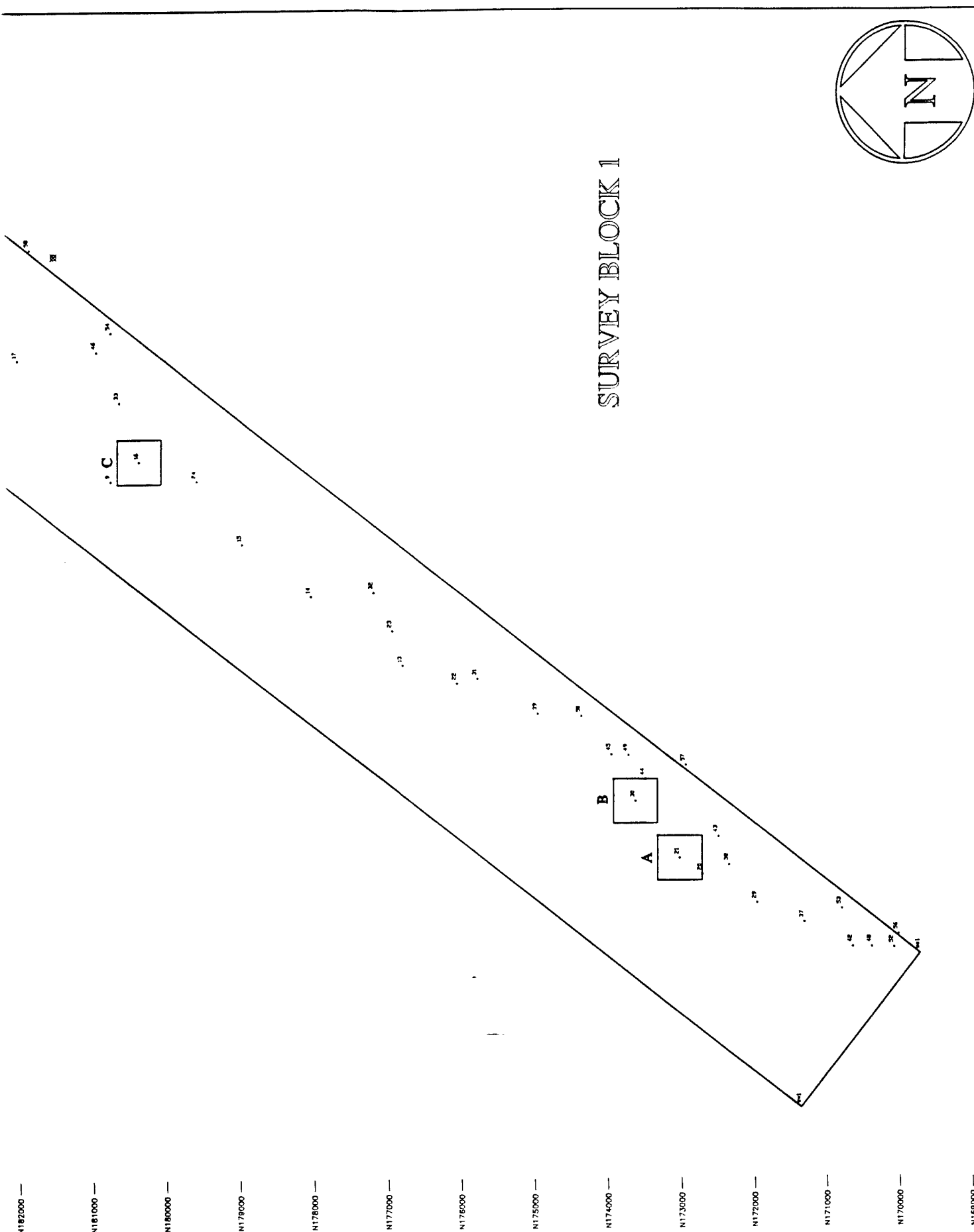
Miscellaneous Identified Targets. The survey of Block 1 revealed the presence of a petroleum platform and associated debris. The petroleum platform accounted for two of the magnetic targets and seven of the acoustic anomalies: M46, M54, A29, A37, A38, A39, A40, A41, and A42. Magnetic anomalies M46 and M54 are high amplitude (3,416.0 and 1,146.0 gammas), multi-component anomalies of long duration (73.6 and 528.2 seconds). The petroleum platform itself

**TABLE 1. CLUSTERS WITH COMPONENT ANOMALIES AND ASSESSMENT OF
POTENTIAL FOR CONTAINING CULTURAL RESOURCES**

Cluster	Anomalies	Potential for Cultural Resources
1-1	M20-22, 38, 43	Low
1-2	M42, 48, 52, 56; A35	Low
2-1	M79, 95, 107, 117	Low
2-2	M87, 97-99; B4	Moderate
2-3	M145-146, 154, 165; A76-80	Low
2-4	M101, 111, 124, 134	Moderate
2-5	M63, 80, 84; A46-47	Low
2-6	M109-119	Low to moderate
3-1	M443-444, 459-460, 511	Moderate to high
3-2	M464-465, 504, 515-516	Moderate to high
3-3	M541, 558, 578	Moderate to high
3-4	M390, 410, 438, 448-449, 469	Moderate
3-5	M384, 387, 405-406	Moderate to high
3-6	M411, 450-451, 470-471, 498-499	Moderate to high
3-7	M226-228, 266-270, 311-317, 341-344, 378	Moderate to high
3-8	M236-238, 282	Moderate
3-9	M473, 496, 519, 536, 554	Moderate
3-10	M305-306, 350, 373, 395-396, 414-415	Moderate

Cluster	Anomalies	Potential for Cultural Resources
3-11	M417, 435, 453, 476-477, 491	Moderate
3-12	M478, 490, 522, 532, 550-552, 570	Moderate
3-13	M210, 246-247, 296-298, 356, 363-364	Moderate
4-1	M734, 752-753, 768; B51	Low to moderate
4-2	M722, 741, 754-755	Moderate
4-3	M756-757, 770-771; B57	Moderate to high
4-4	M657, 676-678, 719-720, 733	Moderate to high
4-5	M690-691, 724-725, 738	Low
4-6	M684, 699-701	Low
4-7	M796-797, 819	Low
4-8	M827, 833, 835, 847	Low to moderate
4-9	M844-845, 855-856	Low to moderate
5-1	M875, 912, 931; B89	Moderate
5-2	M867, 884-887, 907-908, 919-923, 940-942, 951-953, 956-958, 965; B105; A162	Moderate
5-3	M932, 934-935, 955; B109-112	Moderate
5-4	M961, 967, 972	Moderate to high
5-5	M891-894, 902, 944, 947	Moderate
5-6	M888-889, 905, 917	Moderate
5-7	M987-988	Low
5-8	M954, 964	Low to moderate





SURVEY BLOCK 1

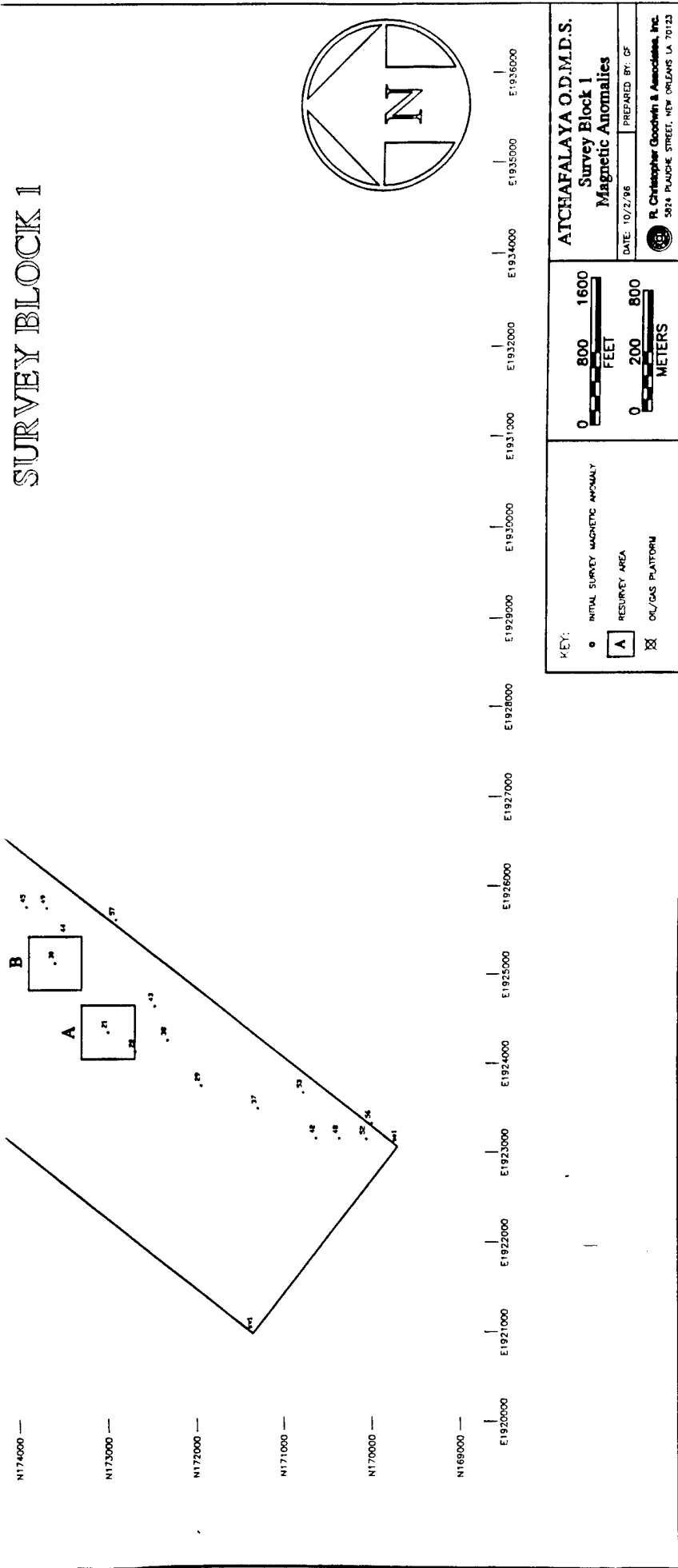


Figure 10. Center points of magnetic anomalies, Block 1

N187000 —

N186000 —

N185000 —

N184000 —

N183000 —

N182000 —

N181000 —

N180000 —

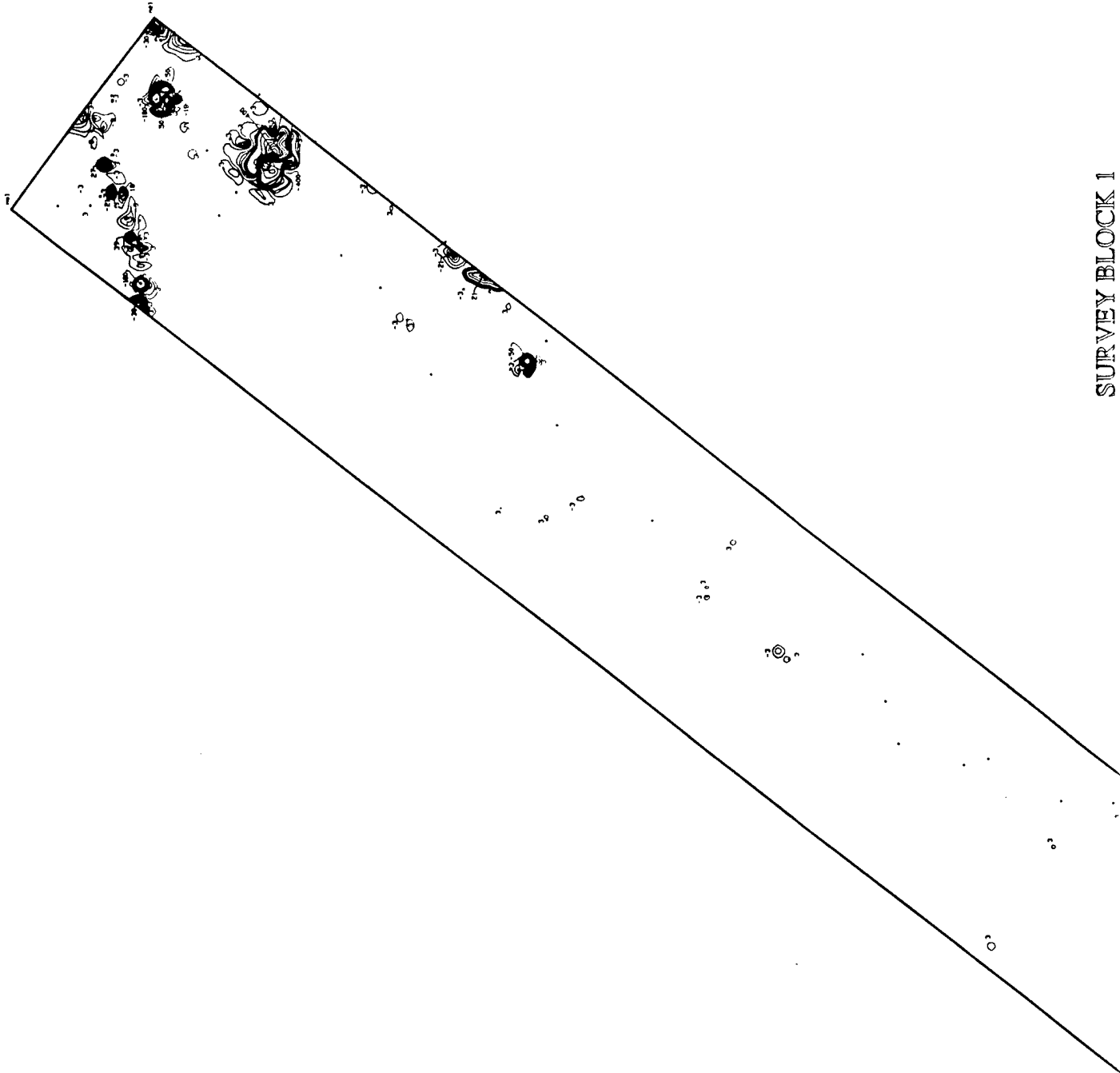
N179000 —

N178000 —

N177000 —

N176000 —

N175000 —



SURVEY BLOCK 1

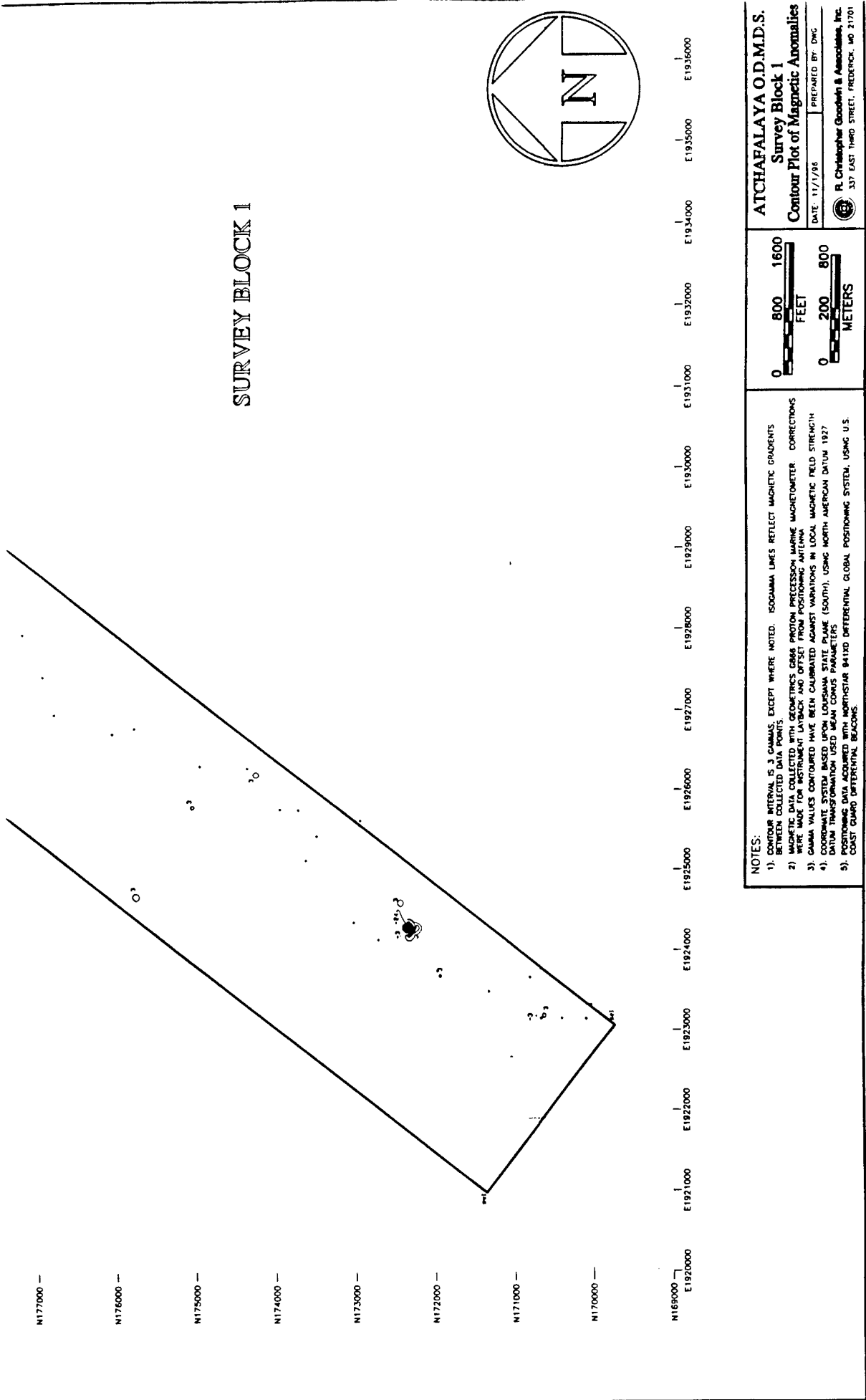


Figure 11. Contour map of magnetic anomalies, Block 1

Figure 12 is located at the back of this report.

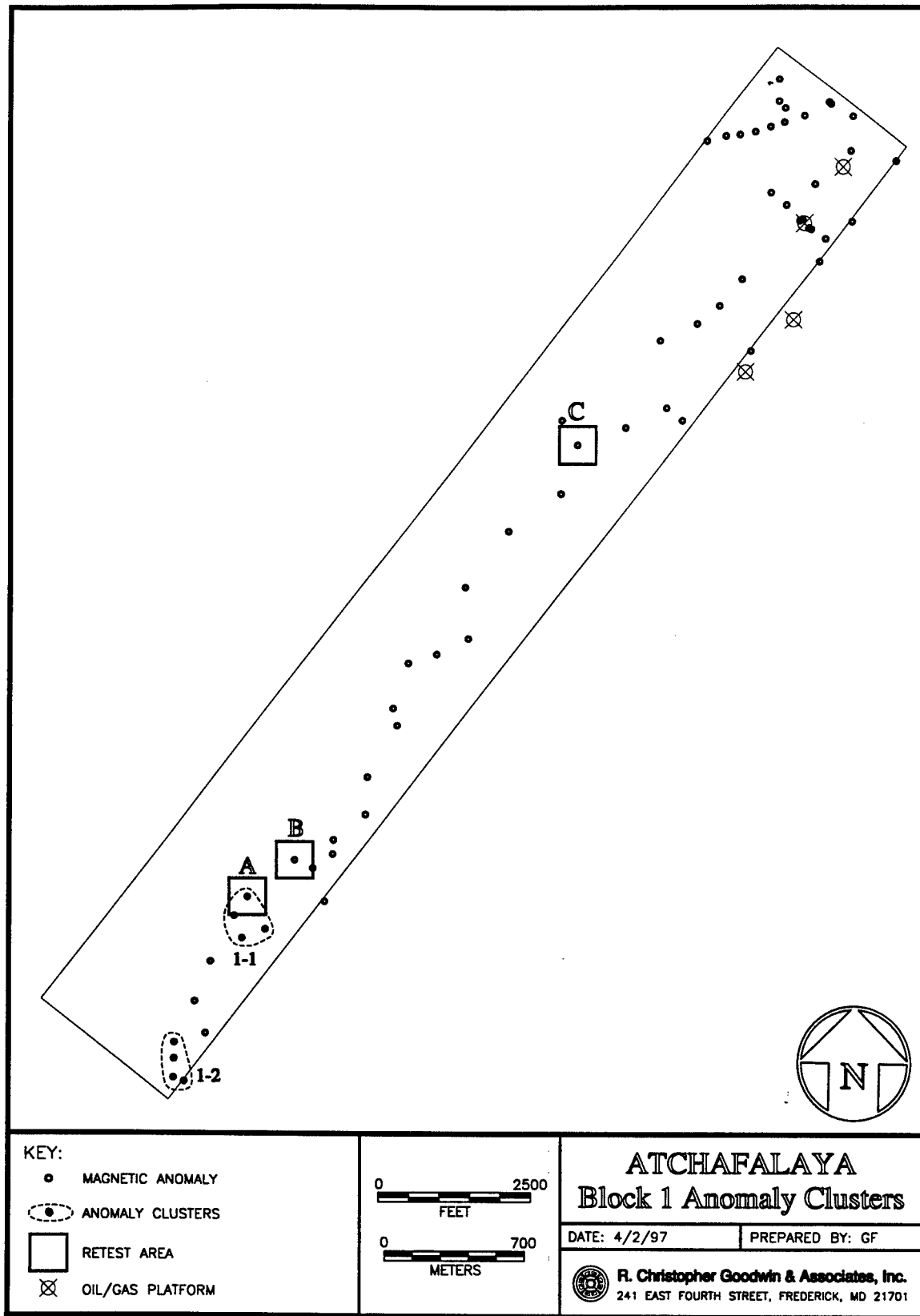


Figure 13. Anomaly clusters, Block 1

produced magnetic anomaly M46 and acoustic anomaly A29. Magnetic anomaly M54 and its correlates, acoustic anomalies A37 (Figure 14) through A42 (Figure 15), resulted from the field of debris associated with the platform.

Results of Block 2 Initial Survey Data Analysis

Block 2 contains a total of 142 magnetic anomalies, 96 acoustic anomalies, and 10 bathymetric anomalies (Figures 16 - 18). Analysis of these anomalies revealed that 46 of the acoustic targets and four of the bathymetric anomalies were correlated with magnetic anomalies. There are four correlations between the acoustic and bathymetric data sets, and five anomalies occur in all three data sets. Analysis of the magnetic data from Block 2 revealed six potentially interesting clusters of magnetic anomalies (Figure 19).

Cluster 2-1. Cluster 2-1 contains four magnetic anomalies: M79, M95, M107, and M117. Anomalies M79, M95, and M107 are low amplitude (10.5, 7.0, and 10.5 gammas), dipolar and monopolar anomalies with short durations (9.3, 7.7, and 7.7 seconds). Anomaly M117 is a moderate amplitude (22.0 gammas) monopolar anomaly of moderate duration (17.0 seconds). No bathymetric or acoustic anomalies are associated with the magnetic anomalies comprising Cluster 2-1. Cluster 2-1's probability for being associated with a potential cultural resource is considered low.

Cluster 2-2. Cluster 2-2 contains one bathymetric and four magnetic anomalies: B4, M87, M97, M98, and M99. Anomaly M87 is a moderate amplitude (23.5 gammas), multi-component anomaly of long duration (39.1 seconds), which correlates with bathymetric anomaly B4, a 12 ft (3.69 m) tall peak probably resulting from modern debris on the bottom. Anomalies M97, M98, and M99 are low amplitude (8.5, 9.0, and 19.0 gammas), dipolar, multi-component, and monopolar anomalies with short durations (7.7, 7.7, and 3.3 seconds). No acoustic anomalies are associated with the magnetic targets in Cluster 2-2. The probability that Cluster 2-2 represents a potential cultural resource is moderate.

Cluster 2-3. Cluster 2-3 is composed of four magnetic and five acoustic anomalies: M145, M146, M154, M165, A76, A77, A78, A79, and A80. Anomaly M145 is a low amplitude (11.5 gammas) monopolar anomaly of short duration (4.3 seconds). Anomalies M146 and M165 are moderate amplitude (92.0 and 24.0 gammas), dipolar, multi-component anomalies of moderate to long duration (16.5 and 42.3 seconds). Anomaly M154 is a moderately strong amplitude (24.5 gammas), multi-component anomaly of long duration (161.8 seconds). Anomaly M154 is associated with five acoustic anomalies (A76, A77, A78, A79, and A80). Anomaly A76 is a large crescent-shaped target of unknown identity. Anomalies A77, A79, and A80 are 70-80 ft (21.34-24.39 m) wide, irregularly shaped unidentifiable features, with a variety of very small hard returns scattered in the vicinity, some of which are clearly pieces of pipe; the sonagram of this area (Figure 20) makes it clear that these targets, although easily detected, are not elements of a shipwreck. Anomaly A78 is an unidentifiable, 40 ft (12.20 m) wide, rectangular object. Based on the size and shape of the acoustic targets and the relative absence of sedimentation and scour on or around the remains, it is probable that these sonar targets represent modern disturbance and debris. No bathymetric anomalies are associated with any of the targets in Cluster 2-3. The probability that Cluster 2-3 represents a significant cultural resource is low.

Cluster 2-4. Cluster 2-4 contains four magnetic anomalies: M101, M111, M124, and M134. Anomaly M101 is a moderate amplitude (85.0 gammas) monopolar magnetic perturbation of short duration, lasting only 8.8 seconds. Anomalies M111, M124, and M134 are low amplitude (16.0, 5.5, and 7.5 gammas) monopolar and dipolar disturbances that are short to moderate in their duration (12.1, 18.1, and 8.8 seconds). No acoustic or bathymetric anomalies are associated with the targets in Cluster 2-4. The probability that Cluster 2-4 represents a significant cultural resource is moderate.

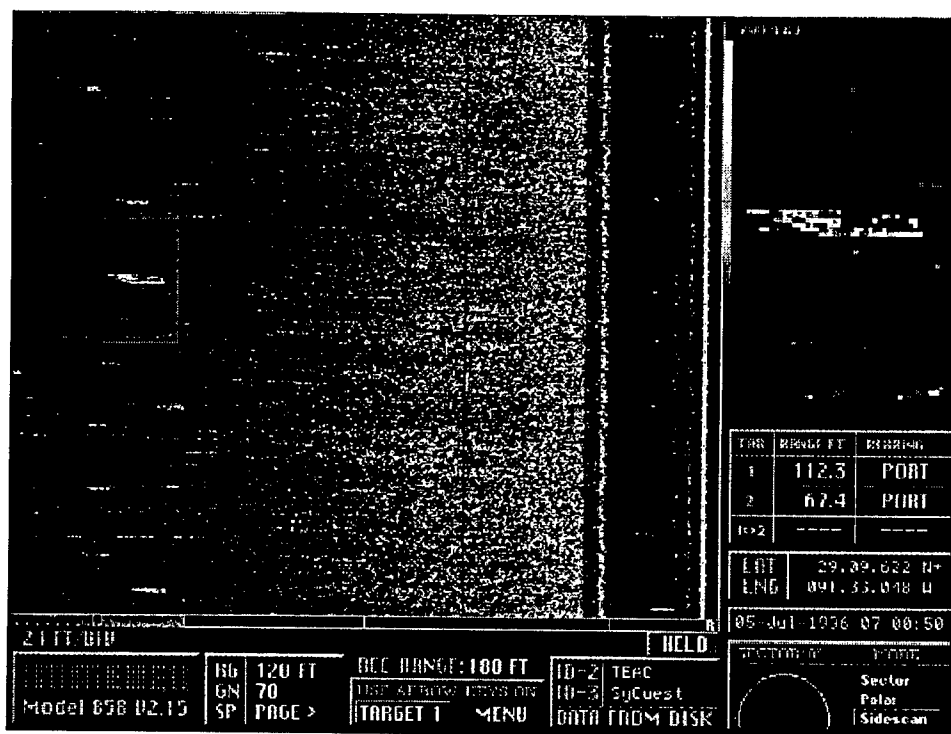


Figure 14. Sonar anomaly A37 at center left of screen; magnified x3 to right. Trawl scar across the lower part of the image

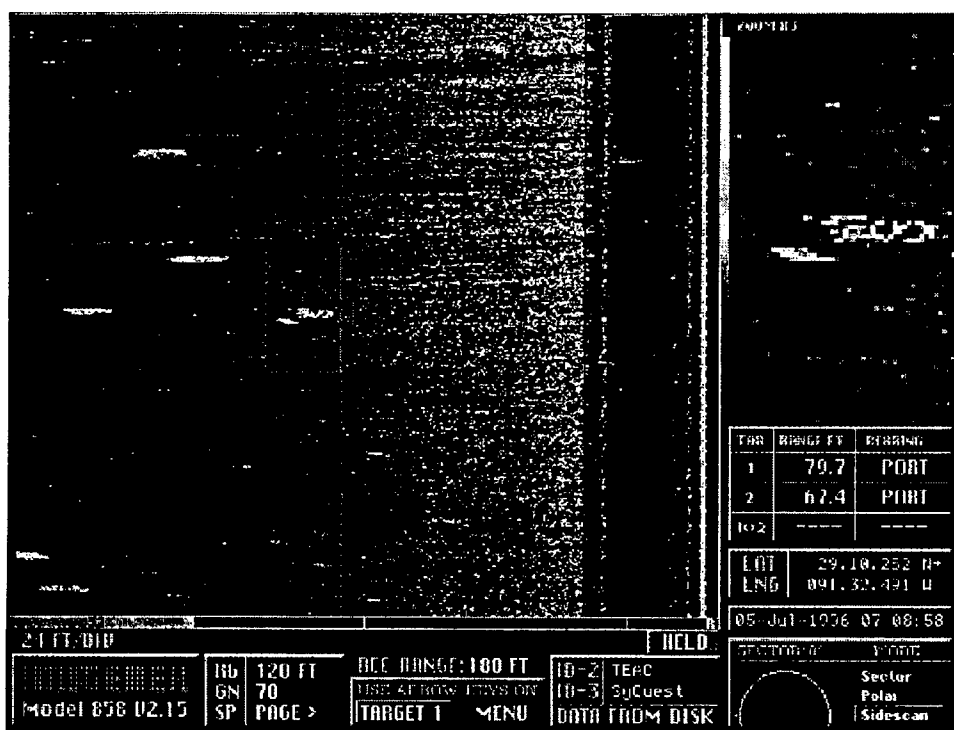
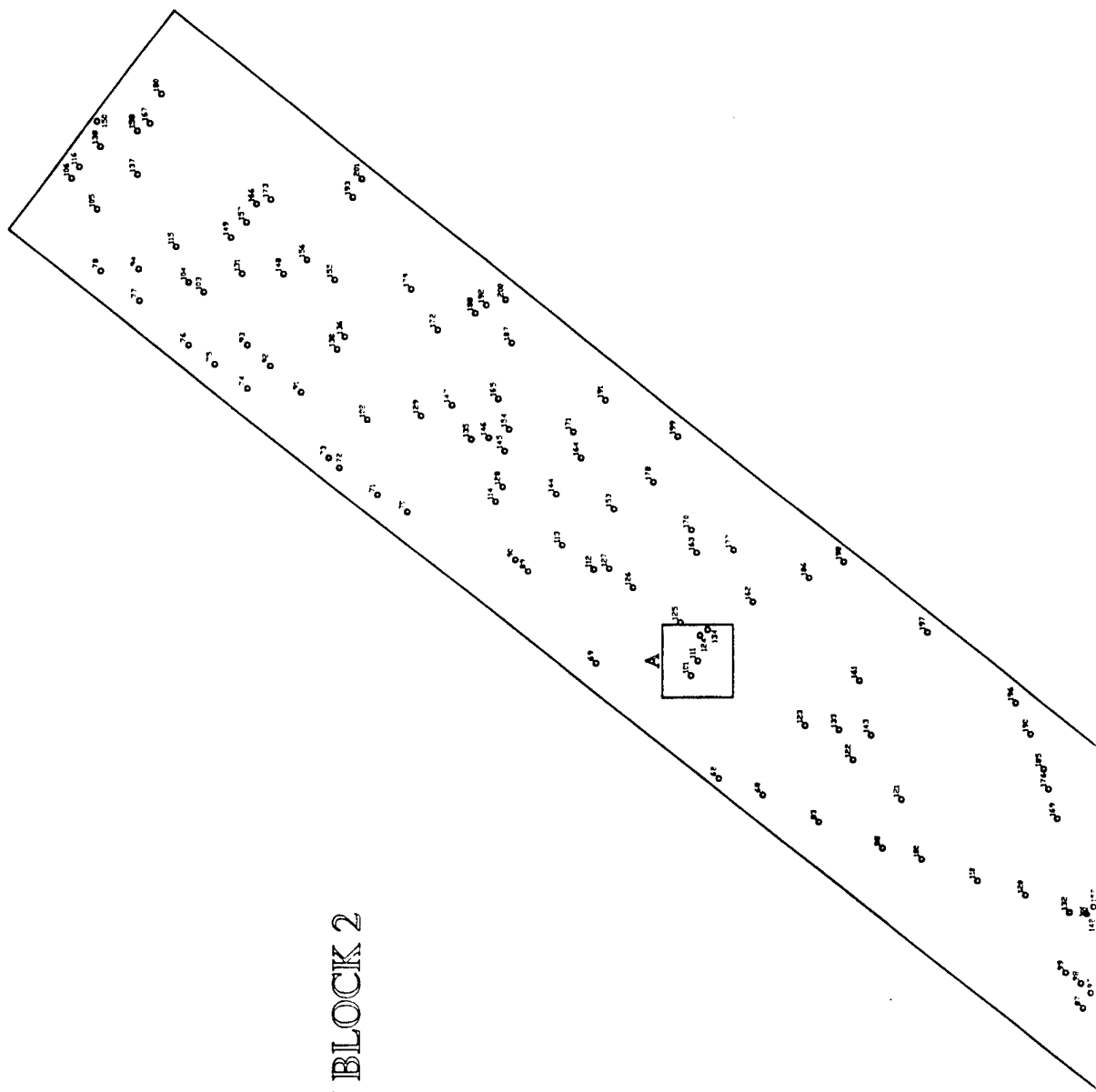


Figure 15. Sonar anomaly A42

SURVEY BLOCK 2



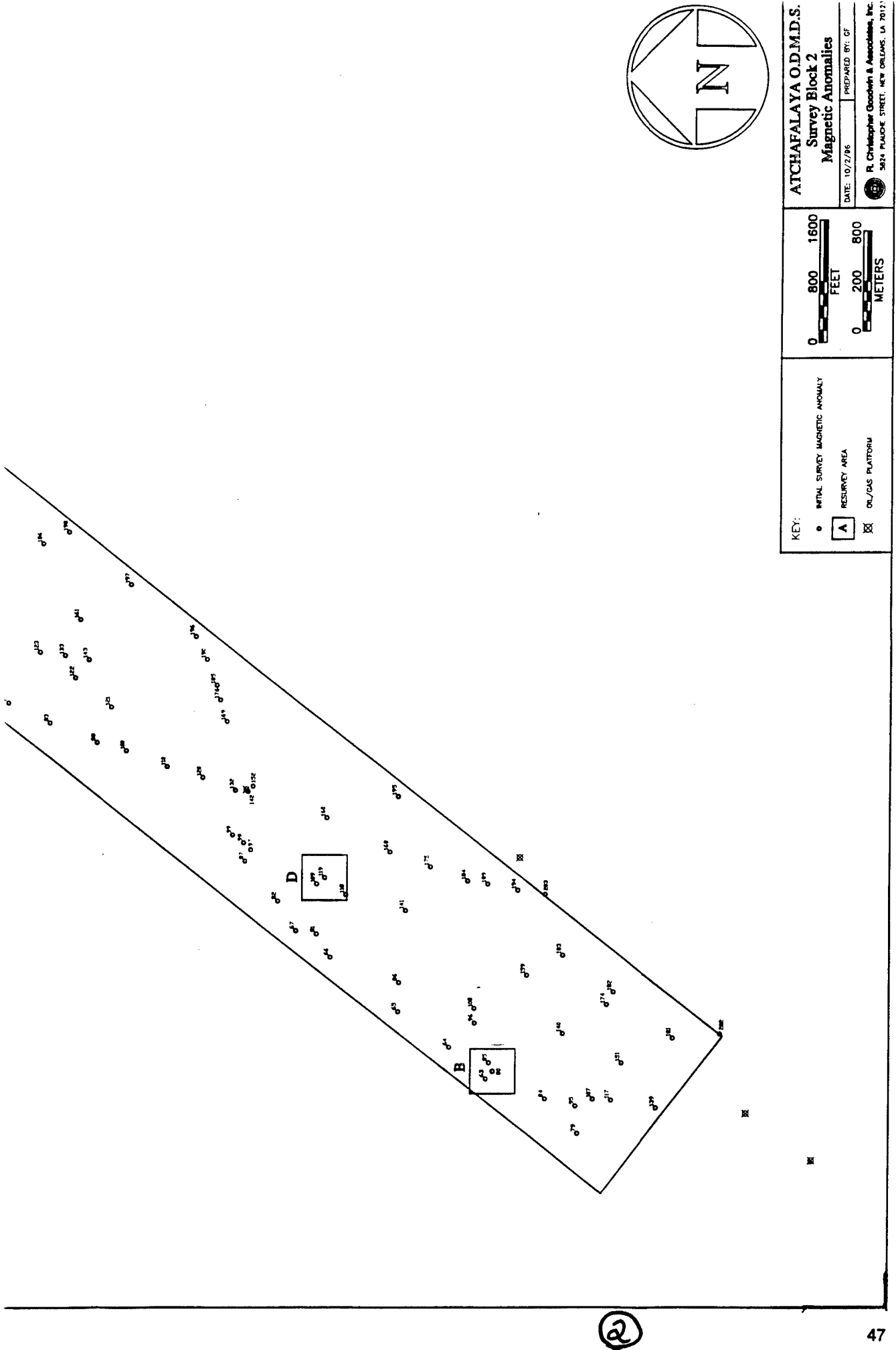
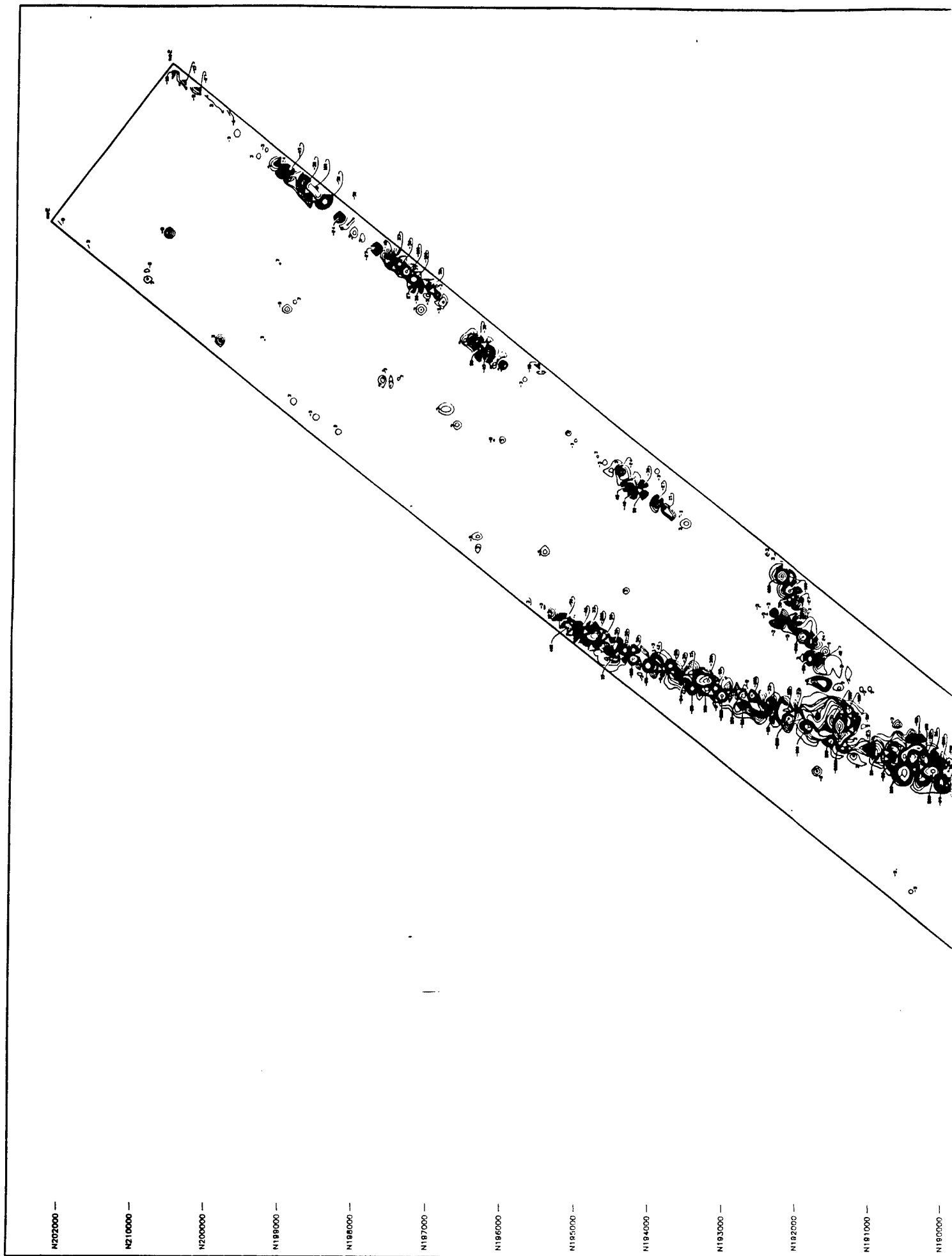


Figure 16. Center points of magnetic anomalies, Block 2



N202000 —

N210000 —

N200000 —

N198000 —

N198000 —

N197000 —

N196000 —

N195000 —

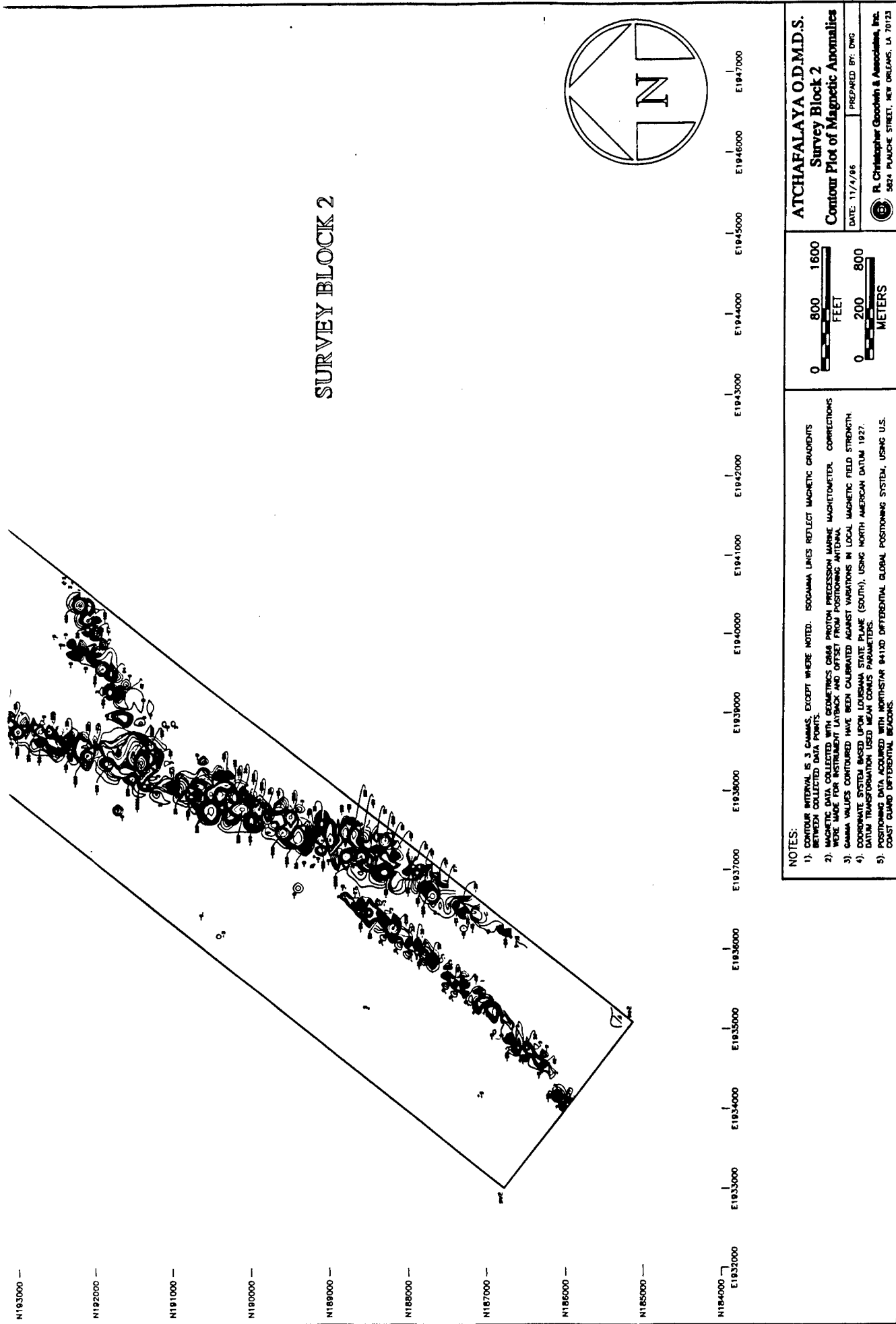
N194000 —

N193000 —

N192000 —

N191000 —

N190000 —



ATCHAFALAYA O.D.M.D.S.
Survey Block 2
Contour Plot of Magnetic Anomalies

DATE: 11/4/96
PREPARED BY: DWG

R. Christopher Goodwin & Associates, Inc.
5024 PLATON STREET, NEW ORLEANS, LA 70123

NOTES:

- 1) CONTOUR INTERVAL IS 3 GAMMAS, EXCEPT WHERE NOTED. SODIUM LINES REFLECT MAGNETIC GRADIENTS BETWEEN COLLECTED DATA POINTS.
- 2) MAGNETIC DATA COLLECTED WITH GEOMETRICS ORBITA PROTON PRESSION MARKING MAGNETOMETER. CORRECTIONS WERE MADE FOR INSTRUMENT LAYBACK AND OFFSET FROM POSITIONING ANTENNA.
- 3) GAMMA VALUES CONTAINED HAVE BEEN CALIBRATED AGAINST VARIATIONS IN LOCAL MAGNETIC FIELD STRENGTH.
- 4) COORDINATE SYSTEM BASED UPON LOUISIANA STATE PLANE (SOUTH), USING NORTH AMERICAN DATUM 1927.
- 5) POSITIONING DATA ACQUIRED WITH NORTHSTAR 941XD DIFFERENTIAL GLOBAL POSITIONING SYSTEM, USING U.S. COAST AND GEODETIC BEACONS.

Figure 17. Contour map of magnetic anomaly gradients, Block 2

Figure 18 is located at the back of this report.

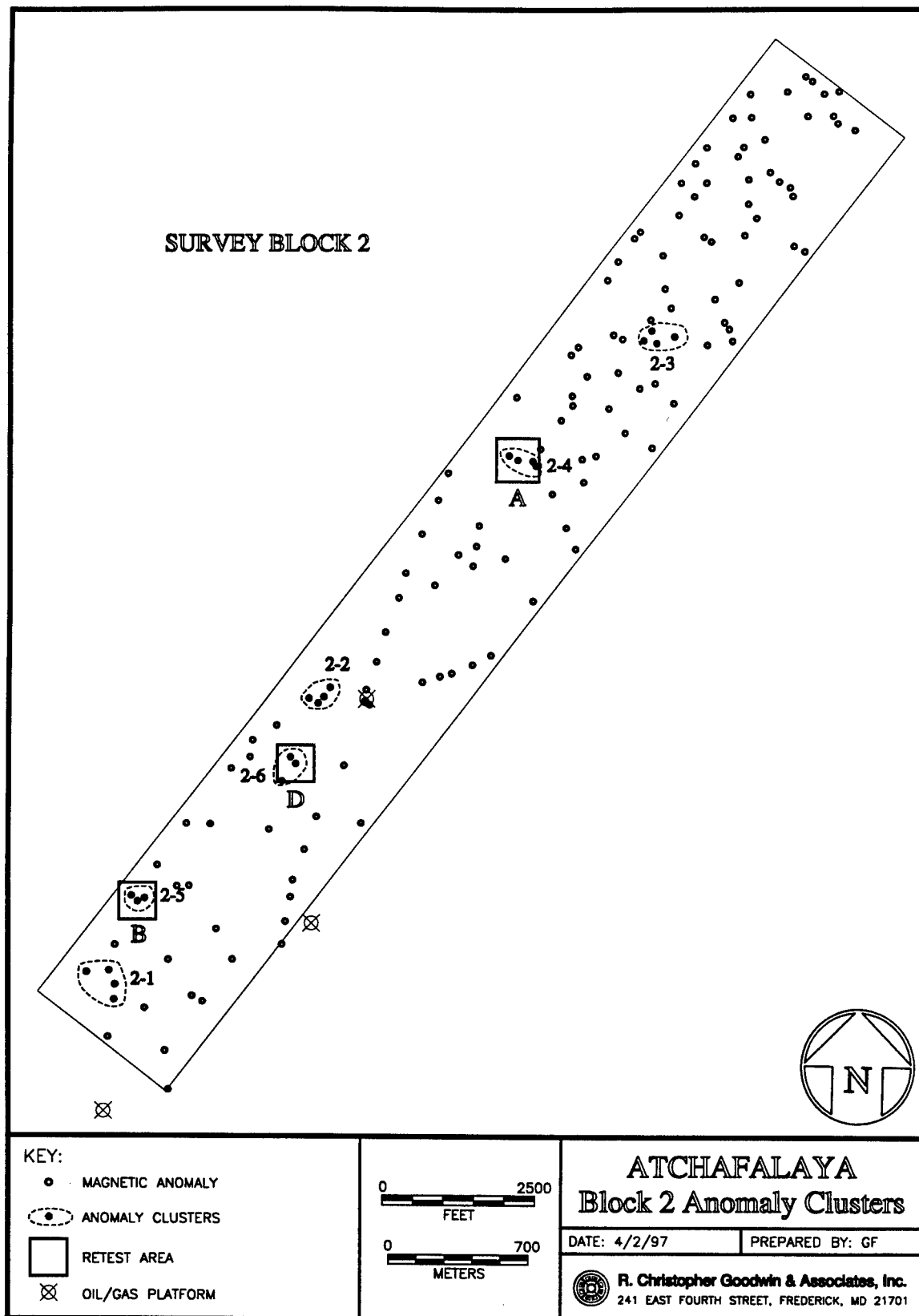


Figure 19. Anomaly clusters, Block 2



Figure 20. Sonar targets A77-80, visible as wide, oval shaped returns, mixed with small hard returns which show up as white spots

Cluster 2-5. Cluster 2-5 contains three magnetic anomalies and two acoustic anomalies: M63, M80, M85, A46, and A47. Anomaly M80 is a moderate amplitude (32.5 gammas), moderate duration (25.1 seconds), multicomponent target. Anomalies M63 and M85 are both low amplitude (11.5 and 5.0 gammas), monopolar disturbances of moderate duration (12.0 and 18.0 seconds). Magnetic anomaly M63 is associated with two pronounced linear objects, acoustic anomalies A46 and A47. No bathymetric anomalies are associated with the magnetic targets that form Cluster 2-5. Although Cluster 2-5 may represent modern debris related to the petroleum industry, the correlation of acoustic and magnetic targets suggests that resurvey might be useful.

Cluster 2-6. Cluster 2-6 contains three magnetic anomalies: M109, M118, and M119. Anomaly M109 is a low amplitude (9.5 gammas), monopolar deflection of short duration (6.1 seconds). Anomaly M118 is a low amplitude (10.0 gammas) multi-component disturbance, lasting 20.9 seconds. Anomaly M119 is a moderate amplitude (27.5 gammas), dipolar magnetic perturbation of moderate duration (18.4 seconds). No bathymetric or acoustic anomalies are associated with the magnetic targets in Cluster 2-6. The likelihood that Cluster 2-6 is related to a potential cultural resource is low to moderate.

Miscellaneous Identified Targets. The presence of two petroleum pipelines was clearly recorded in Block 2, seen most clearly in the contour plot of Block 2 (Figure 17). The first line runs almost parallel with the long axis of the survey block, starting in the center of the south end of the block and ending in the northeast corner of the block. The second cuts across the block more acutely, running roughly SSE to NNE. These pipelines are represented by 32 magnetic targets, 17 acoustic anomalies, and three bathymetric anomalies: M62, M68, M83, M88, M100, M110, M120, M132, M139, M140, M142, M151, M152, M159, M160, M168, M169, M175, M176, M183, M184, M185, M186, M189, M190, M191, M194, M196, M198, M199, M200, M201, A53, A55, A56, A57, A60, A61, A62, A84, A108, A109, A113, A131, A132, A134, A135, A136, A137, B8, B10, and B11.

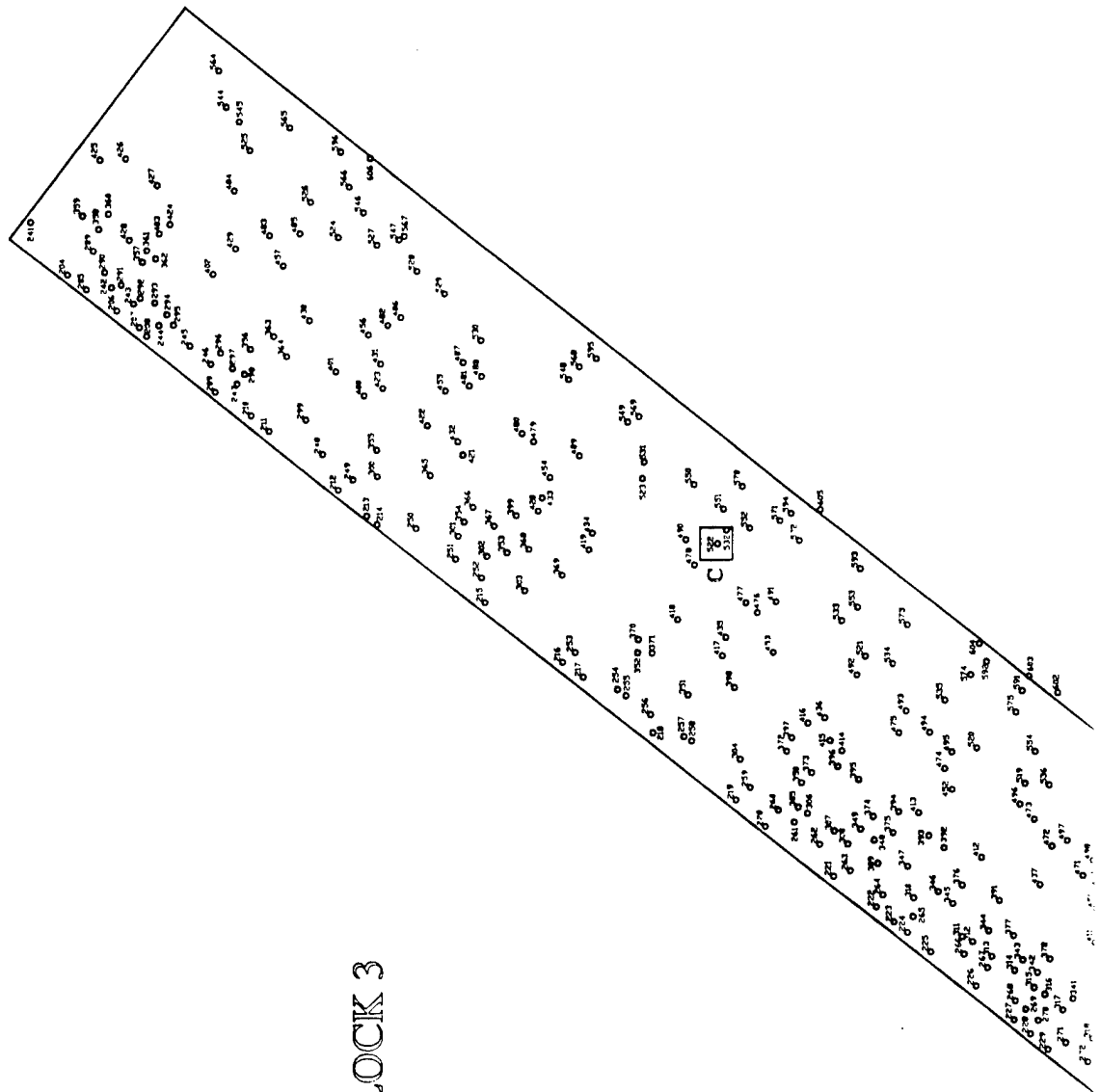
Results of Block 3 Initial Survey Data Analysis

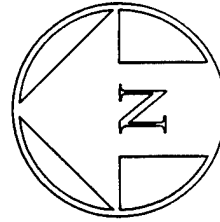
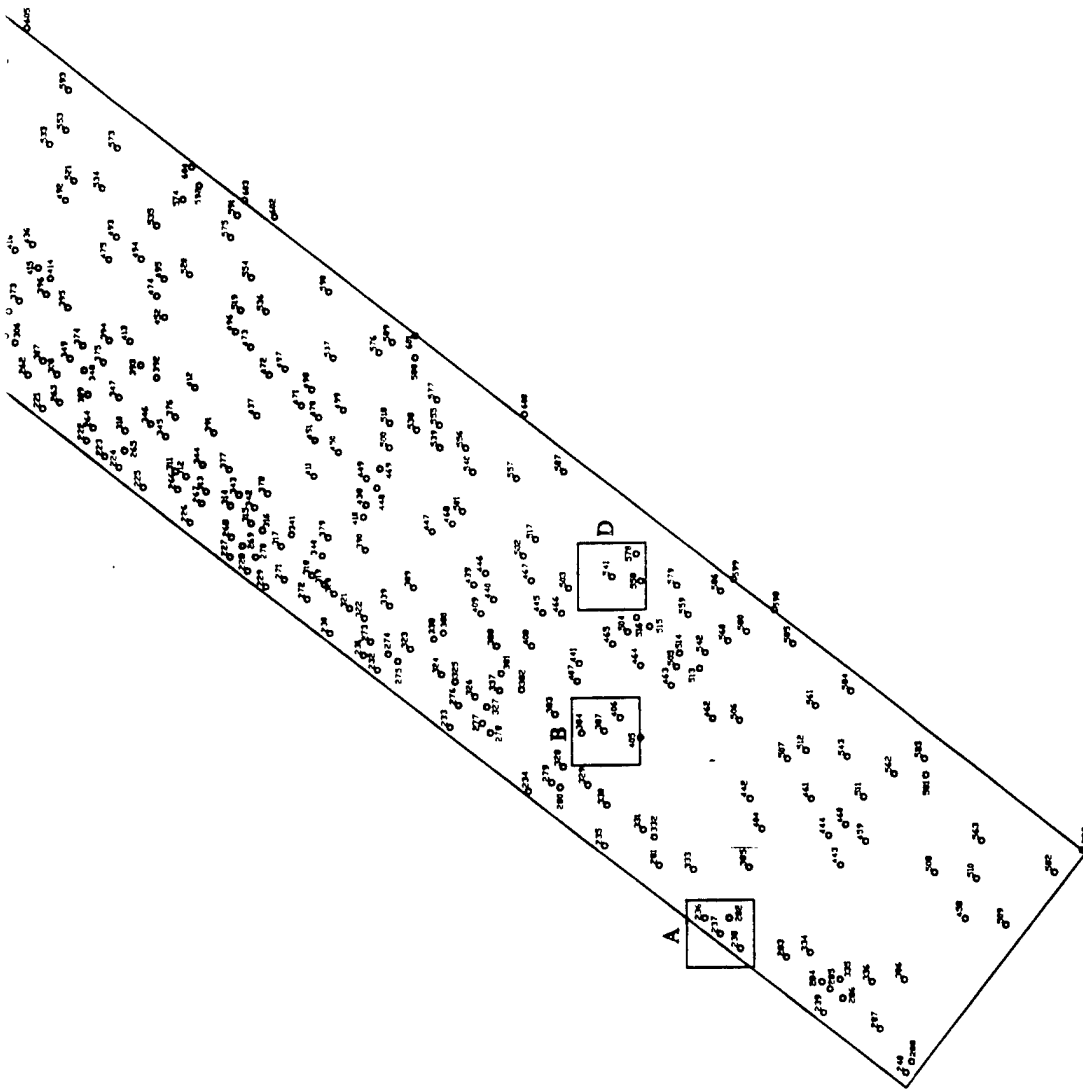
Survey Block 3 contains a total of 403 magnetic anomalies, 7 acoustic anomalies, and 36 bathymetric anomalies (Figures 21 - 23). Two of the acoustic targets and 20 of the bathymetric anomalies were found to correlate with magnetic anomalies; however, no correlations between acoustic and bathymetric anomalies were observed, nor were there any instances when anomalies from all three data sets correlated. Detailed analysis of the magnetic point plot and contour maps revealed that Block 3 contains a total of 13 magnetic anomaly clusters (Figure 24).

Cluster 3-1. Cluster 3-1 comprises five magnetic anomalies: M443; M444; M459; M460; and M511. Anomaly M443 is a strong amplitude (108.0 gammas) multicomponent disturbance of long duration, lasting 35.7 seconds. Anomaly M444 is a moderately strong (25.0 gammas), long duration (93.2 seconds), multicomponent perturbation. Both M459 and M460 are relatively brief (15.1 and 12.2 seconds) disturbances, with monopolar negative signatures that measured 163.0 and 23.5 gammas. Anomaly M511 is a moderately strong amplitude (34.5 gammas), multicomponent anomaly with a 14.8 second duration. None of the magnetic disturbances forming cluster 3-1 are accompanied by acoustic or bathymetric signatures. Cluster 3-1 is believed to have a moderate to high potential for representing potential submerged cultural resources. This was not evident until the data was postprocessed, consequently this cluster was not among those resurveyed.

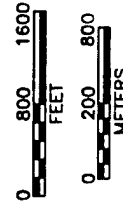
Cluster 3-2. Cluster 3-2 consists of a relatively widely-spaced grouping of five magnetic anomalies M464, M465, M504, M515, and M516. Anomaly M464 is a brief (6 seconds), low amplitude (16 gammas) positive monopolar perturbation. M465 is a relatively weak (14.0 gammas), dipolar disturbance of moderate duration (13.6 seconds). Anomaly M504 produced a moderate duration (25.7 seconds), multicomponent, magnetic disturbance (20.5 gammas). Anomaly M515

SURVEY BLOCK 3





ATCHAFALAYA O.D.M.D.S. Survey Block 3 Magnetic Anomalies	
DATE: 10/2/96	PREPARED BY: GF
R. Christopher Goodwin & Associates, Inc. 5824 PLAQUE STREET, NEW ORLEANS, LA 70112	



KEY:

- INITIAL SURVEY MAGNETIC ANOMALY
- RESURVEY AREA

Figure 21. Center points of magnetic anomalies, Block 3

N218000 —

N217000 —

N216000 —

N215000 —

N214000 —

N213000 —

N212000 —

N211000 —

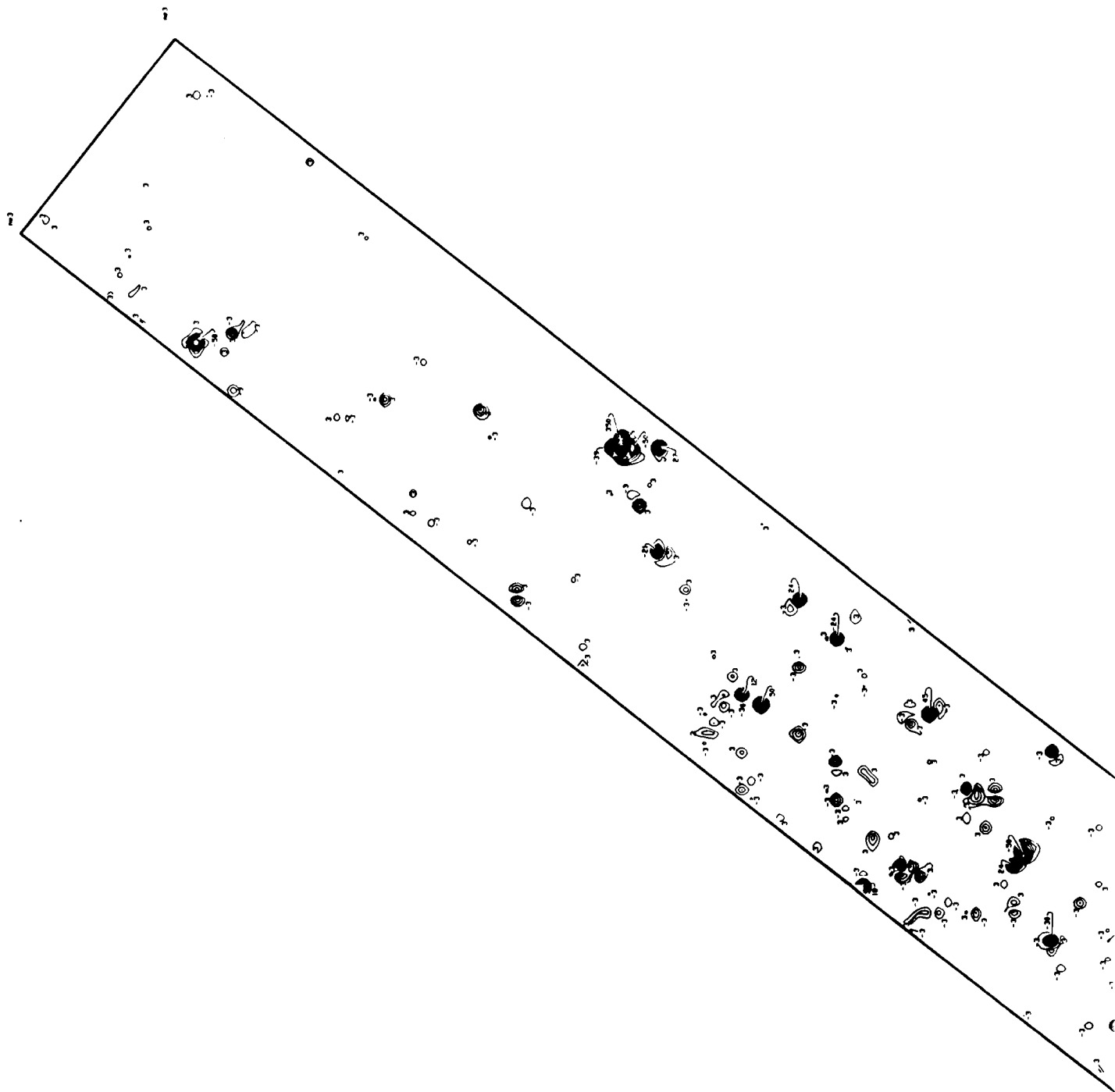
N210000 —

N209000 —

N208000 —

N207000 —

N206000 —



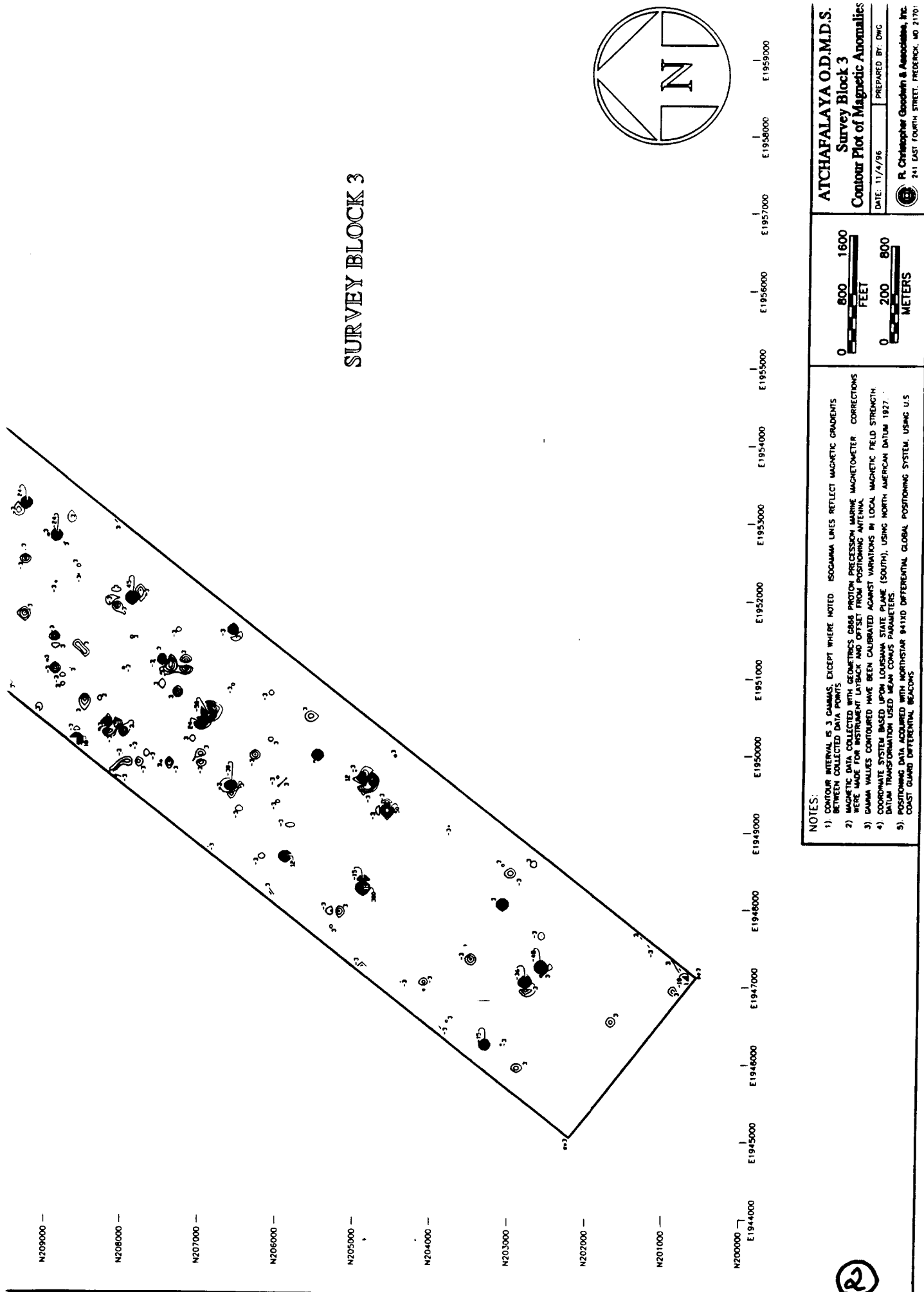


Figure 22. Contour map of magnetic anomaly gradients, Block 3

Figure 23 is located at the back of this report.

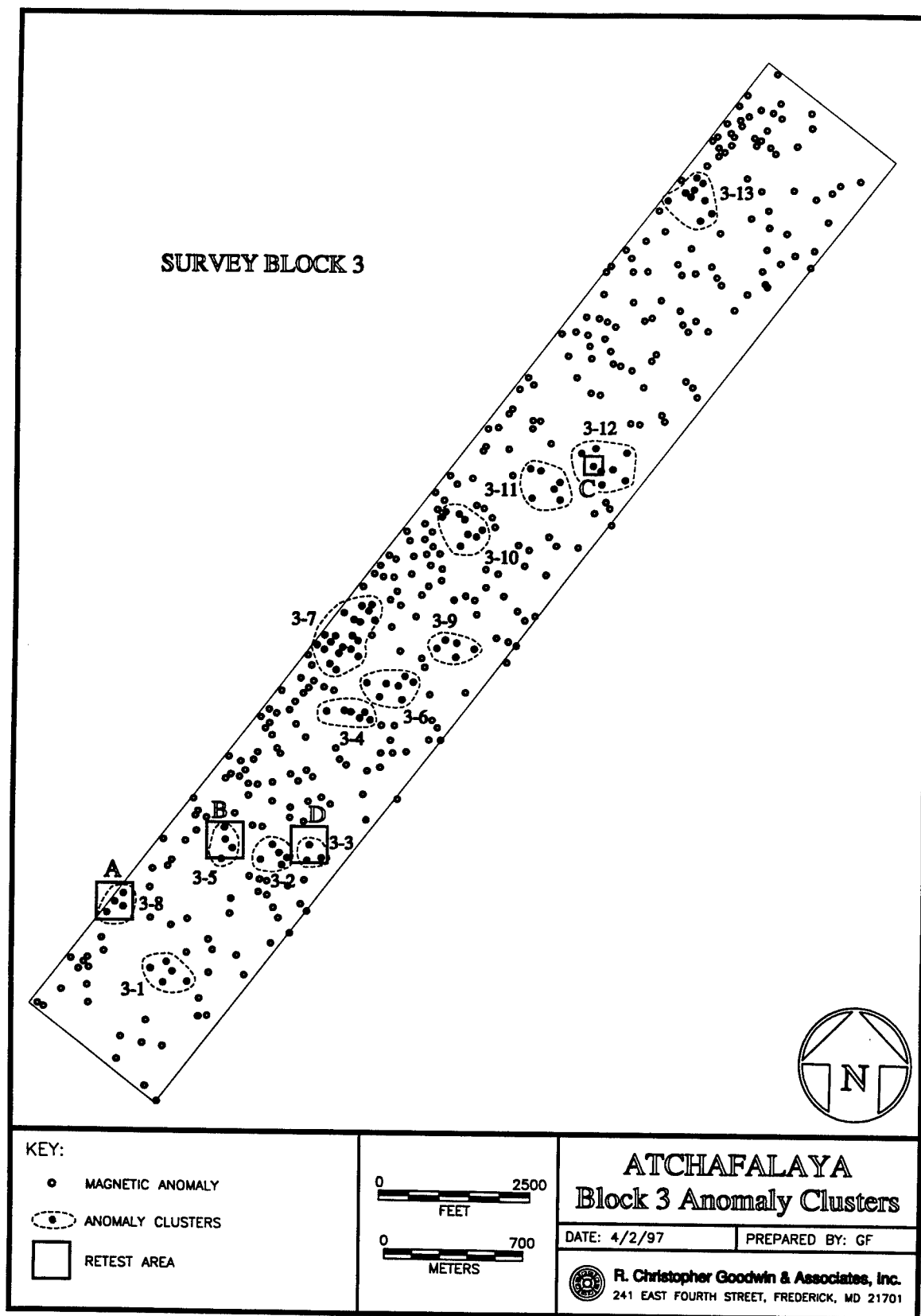


Figure 24. Anomaly clusters, Block 3

is a brief (10.5 seconds), low amplitude (11.5 gammas) multicomponent deflection. Anomaly M516 produced a very strong dipolar magnetic disturbance (250.0 gammas) of moderate duration (15.3 seconds). None of the magnetic anomalies comprising Cluster 3-2 are accompanied by acoustic or bathymetric anomalies. Cluster 3-2 probably was produced by a large ferrous mass surrounded by smaller debris, which are buried beneath a heavy layer of sediment. Cluster 3-2 is considered to have a moderate to high potential for representing a submerged cultural resource.

Cluster 3-3. Immediately east of Cluster 3-2 is a similar group of three magnetic disturbances (M541, M558, and M578), which together comprise Cluster 3-3. Magnetic anomaly M541 is an extremely strong dipolar disturbance of 2,938.0 gammas, with a moderate duration (13.5 seconds). Anomalies M558 and M578 are both positive deflections of moderate and low amplitudes (14.0 and 8.5 gammas) and moderate duration (12.0 and 10.5 seconds). No accompanying anomalous acoustic or bathymetric events were observed in the vicinity of any of the magnetic anomalies in Cluster 3-3. Like Cluster 3-2, the magnetic anomalies forming Cluster 3-3 appear to have been caused by a large ferrous mass that is surrounded by a field of smaller ferrous objects, all of which are buried beneath a layer of sediment. The magnetic anomalies forming Cluster 3-3 are considered to have a moderate to high potential for representing a submerged cultural resource and the cluster was included among those selected for resurvey.

Cluster 3-4. Six magnetic anomalies comprise Cluster 3-4: M390; M410; M438; M448; M449; and M469. Anomaly M390 is a strongly positive monopolar magnetic disturbance of 121.5 gammas, with a brief duration of 7.1 seconds. Anomalies M410 and M438 are moderately strong (60.0 and 24.0 gammas), positive monopolar disturbances of moderate duration (10.3 and 8.8 seconds). Anomalies M448 and M469 are both strong (411.5 and 132.0 gammas) dipolar disturbances of moderate duration (10.4 and 11.8 seconds). Magnetic target M449 is a brief (7.1 seconds), moderately strong (75.5 gammas), negative monopolar perturbation. The anomalies in Cluster 3-4 produced no accompanying acoustic or bathymetric signatures, and are considered to have a moderate probability for representing potential cultural resources.

Cluster 3-5. Cluster 3-5 is composed of four magnetic disturbances: M384, M387, M405, and M406. M384 is a moderately strong dipolar magnetic perturbation of 20.5 gammas, with a moderate duration of 12.0 seconds. Anomaly M387 produced a very strong dipolar deflection, measuring 882.5 gammas, with a moderate duration of 18.1 seconds. Anomaly M405 produced a small positive monopolar deflection of 10.0 gammas, with a brief duration of 7.7 seconds. Magnetic target M406 is a low amplitude (7.5 gammas) multicomponent disturbance with a moderate duration of 25.7 seconds. None of the magnetic anomalies in Cluster 3-5 were accompanied by acoustic or bathymetric anomalies. The magnetic anomalies in Cluster 3-5 appear to represent a large ferrous mass surrounded by a field of smaller ferrous debris that has a moderate to high probability to be a potential submerged cultural resource. The cluster was included among those subjected to resurvey.

Cluster 3-6. Cluster 3-6 comprises seven magnetic anomalies: M411, M450, M451, M470, M471, M498, and M499. Magnetic anomaly M411 is a low amplitude (5.5 gammas) multicomponent perturbation with a short duration of just 7.7 seconds. Anomaly M450 is moderately strong (38.5 gammas) negative monopolar deflection of 12.0 seconds duration. Target M451 is a moderately strong (69.0 gammas) dipolar disturbance with a duration of 8.7 seconds. M470 is a strong (162.0) dipolar magnetic perturbation of 22.0 seconds in duration. Anomaly M471 is a lower amplitude (15.5 gammas) negative monopolar deflection with a short duration of 4.8 seconds. Magnetic targets M498 and M499 are both low amplitude disturbances (13.0 and 14.5 gammas) with dipolar and negative monopolar signatures, lasting for short durations of 9.3 and 8.8 seconds. No correlating acoustic or bathymetric anomalies are associated with the magnetic targets that form Cluster 3-6. The magnetic anomalies in Cluster 3-6 have a moderate to high probability for representing a potential submerged cultural resource.

Cluster 3-7. Cluster 3-7 is composed of 21 anomalies: M226, M227, M228, M266, M267, M268, M269, M270, M311, M312, M313, M314, M315, M316, M317, M341, M342, M343, M344, and M378. Targets M226-M228 consist of brief (8.8, 4.3, and 13.2 seconds, respectively) magnetic perturbations of low to high amplitudes with a variety of signatures (52.0 gamma positive, 210.0 gamma dipolar, 19.5 gamma negative, 158.5 gamma multicomponent, respectively). Anomalies M266-M270 are short duration (7.7, 3.3, 6.0, 3.3, and 7.7 seconds) disturbances, ranging from low to high in their amplitudes with monopolar, dipolar, and multicomponent signatures (17.5 gamma multicomponent [designated "M" hereafter], 20.5 gamma positive [designated "+" hereafter], 14.0 gamma negative [designated "-" hereafter], 30.5+ gamma, 91.5D gamma, respectively). Anomalies M311-M317 are relatively short (10.4, 7.0, 3.3, 13.7, 2.7, 7.1, and 8.7 seconds, respectively) anomalies with a variety of amplitudes and signatures (20.5D gamma, 6.0+ gamma, 56.5- gamma, 93.0M gamma, 8.5- gamma, 27.5- gamma, and 101.0M gamma, respectively). Targets M341-M344 are relatively short (13.7, 9.3, 12.1, and 11.0 seconds) anomalies of various strengths and patterns (14.5M gamma, 71- gamma, 385.5+ gamma, and 103.0M gamma). M378 is a positive, 40.5 gamma anomaly of 11.6 seconds duration. None of the magnetic disturbances in Cluster 3-7 are accompanied by anomalous acoustic or bathymetric events. The enormous size of Cluster 3-7 indicates that it is unlikely to represent a single shipwreck, and therefore must be representative of two or more concentrations of ferrous materials. Cluster 3-7 is considered to have moderate to high probability for representing potential submerged cultural resources.

Cluster 3-8. Cluster 3-8 consists of four magnetic anomalies: M236, M237, M238, and M282. Targets M236, M237, and M238 consist of brief (6.1, 8.9, and 9.2 seconds) magnetic perturbations of low to moderate amplitude with a variety of signatures (8.0+, 10.5M, and 33.0M gammas). Target M282 is a moderate amplitude multicomponent anomaly of moderate duration (11.7 seconds). None of the magnetic disturbances in Cluster 3-8 are accompanied by anomalous acoustic or bathymetric events. The short to moderate duration of the magnetic disturbances, combined with their other characteristics, indicates a moderate probability for Cluster 3-8 representing a potential submerged cultural resource.

Cluster 3-9. Cluster 3-9 comprises five magnetic targets, including anomalies M473, M496, M519, M536, and M554. Targets M473 and M554 are brief (6.2 and 7.2 seconds) dipolar magnetic perturbations of low amplitude (7.5 and 11.0 gammas). Anomalies M496, M519, and M536 are short to moderate duration (7.7, 10.4, and 12.0 seconds) disturbances with high amplitudes and a variety of accompanying signatures (300.0+, 344.5D, and 446.0 - gammas). None of the magnetic disturbances in Cluster 3-9 are accompanied by anomalous acoustic or bathymetric events. Cluster 3-9 is considered to have a moderate probability for representing a submerged cultural resource.

Cluster 3-10. Cluster 3-10 consists of magnetic anomalies M305, M306, M350, M373, M395, M396, M414, and M415. Target M306 is a low amplitude (11.0+ gammas) monopolar anomaly of short duration (3.3 seconds). Anomalies M305, M350, M373, M395, M396, and M414 are moderate duration (12.1, 22.5, 11.5, 19.6, 13.2, and 24.8 seconds) magnetic disturbances with moderate to high amplitudes and a variety of accompanying signatures (138.0M, 78.5M, 106.5D, 110.0M, 72.5D, and 69.0+ gammas). Target M415 is a high amplitude (378.0D gammas) dipolar anomaly of short duration (7.1 seconds). None of the magnetic disturbances in Cluster 3-10 are accompanied by anomalous acoustic or bathymetric events. Cluster 3-10 is considered to have a moderate probability of representing a submerged cultural resource.

Cluster 3-11. Cluster 3-11 is formed by six magnetic anomalies: M417, M435, M453, M476, M477, and M491. Target M417 is a moderate amplitude (25.5M gammas) multicomponent magnetic disturbance of long duration (44.8 seconds). Anomalies M435, M476, and M491 are low amplitude (13.5+, 16.5-, and 9.0- gammas) monopolar magnetic disturbances of moderate duration (20.9, 10.5, and 18.2 seconds). Target M453 and M477 are high amplitude (114.5+ and 266.0-) monopolar anomalies of short duration (8.8 and 7.7 seconds). None of the magnetic disturbances in Cluster

3-11 are accompanied by anomalous acoustic or bathymetric events. Cluster 3-11 is considered to have a moderate probability of representing a submerged cultural resource.

Cluster 3-12. Eight magnetic anomalies (M478, M490, M522, M532, M550, M551, M552, and M570) form Cluster 3-12. Targets M478 and M532 are low to moderate amplitude (9.0D and 51.5D gammas) dipolar magnetic disturbances of moderate duration (13.7 and 11.6 seconds). Anomalies M490, M551, and M552 are moderate amplitude (20.5-, 34.5D, and 30.0-) magnetic disturbances of short duration (6.1, 8.8, and 9.4 seconds). Targets M522, M550, and M570 are high amplitude (341.0D, 3057.0D, and 148.0D) dipolar anomalies of moderate duration (20.8, 12.1, and 13.7 seconds). None of the magnetic anomalies in Cluster 3-12 are accompanied by anomalous acoustic or bathymetric events. The monopolar and dipolar signatures of the magnetic disturbances in Cluster 3-12 indicate a moderate potential that this cluster represents a submerged cultural resource.

Cluster 3-13. Cluster 3-13 comprises nine magnetic anomalies: M210, M246, M247, M296, M297, M298, M356, M363, and M364. Anomalies M210, M247, M296, and M364 are short duration (1.6, 4.5, 7.7, and 7.2 seconds) magnetic disturbances with low to moderate amplitudes (49.5-, 25.5D, 17.5D, and 26.5D gammas) and a variety of accompanying signatures. Targets M246 and M363 are high amplitude (242.5D and 208.0D gammas) dipolar magnetic anomalies with short to moderate durations (9.3 and 14.8 seconds). Anomalies M297, M298, and M356 are low amplitude (16.0M, 10.5M, and 17.0M gammas) multicomponent magnetic disturbances of moderate duration (13.2, 11.6, and 19.7 seconds). None of the magnetic anomalies within Cluster 3-13 have an accompanying anomalous acoustic or bathymetric event. The potential that the magnetic anomalies within Cluster 3-13 represent a submerged cultural resource is moderate.

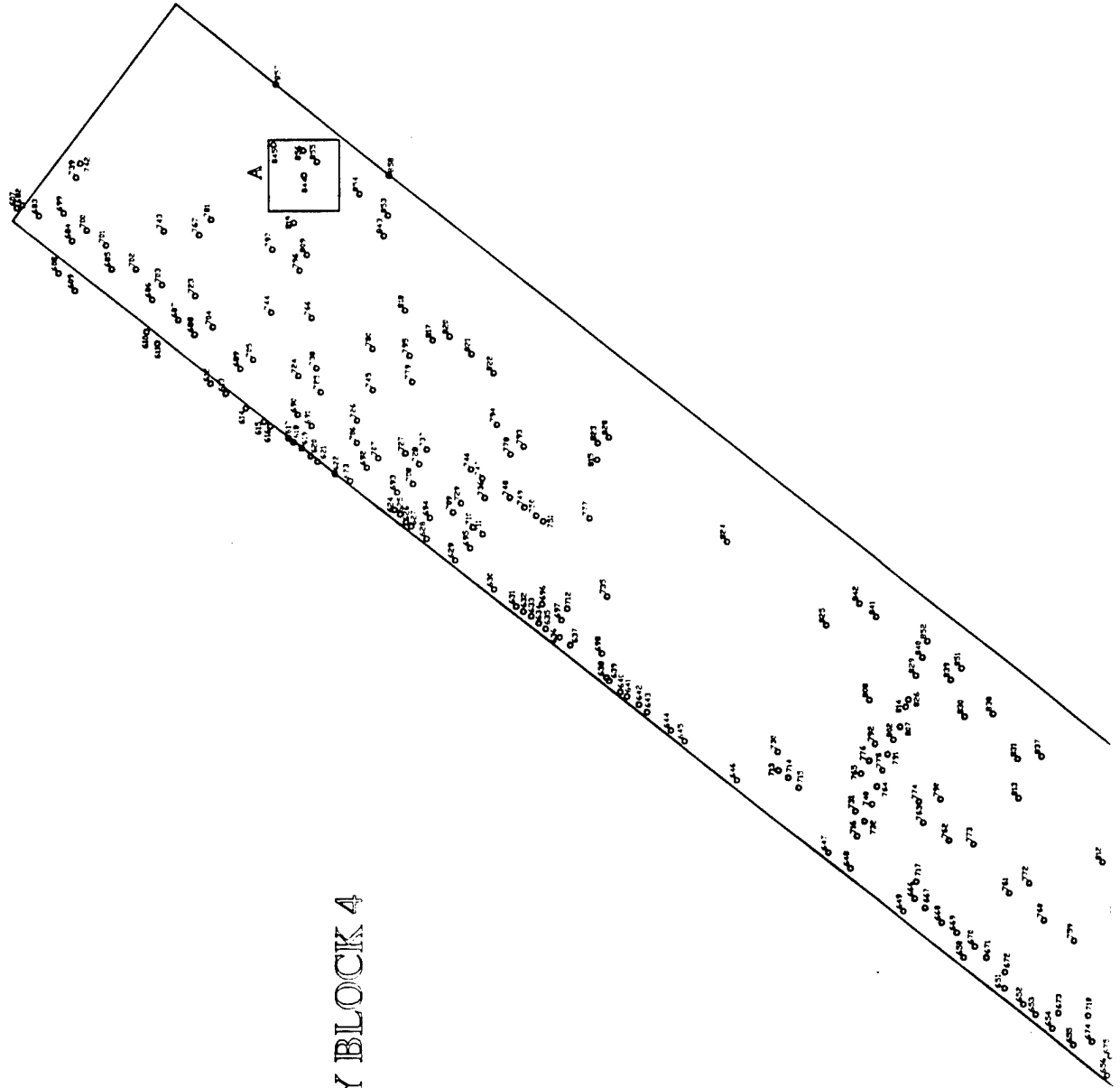
Results of Block 4 Initial Survey Data Analysis

Block 4 contains a total of 252 magnetic anomalies, 17 acoustic anomalies, and 37 bathymetric anomalies (Figures 25 - 27). As noted previously, a small section along the west side of the block could not be surveyed due to dredging activities in the nearby channel. This area can clearly be seen as a void in the depth plots of Figure 27. Analysis of the Block 4 anomalies revealed that two of the acoustic anomalies correlate with magnetic anomalies, and that 14 of the bathymetric targets correlated with magnetic anomalies. A total of four correlations were found between the acoustic and bathymetric data sets. No anomaly correlations occurred between all three of the data sets. Analysis of the magnetic data from Block 4 revealed that there are nine clusters of magnetic anomalies within Block 4 (Figure 28).

Cluster 4-1. Cluster 4-1 contains one bathymetric target and four magnetic anomalies: B51, M734, M752, M753, and M768. Anomalies M734, M752, and M768 are moderate amplitude (56.5, 50.0, and 26.8 gammas), multi-component disturbances that are short to moderate in their duration (7.7, 13.1, and 26.8 seconds). Magnetic anomaly M753 exhibited a low amplitude (8.5 gammas) monopolar signature for only a very short duration of 2.8 seconds. Two of the anomalies, M752 and M753, are associated with bathymetric anomaly B51, which is a 10 ft (3.05 m) deep, flat bottomed depression in the seabed. No acoustic anomalies are associated with the magnetic targets in Cluster 4-1. The magnetic targets comprising Cluster 4-1 have a low to moderate probability for representing potential cultural resources, but anomaly B51 may be indicative of relatively recent disturbance.

Cluster 4-2. Cluster 4-2 is composed of four magnetic anomalies: M722, M741, M754, and M755. Anomaly M755 is a high amplitude (183.0 gammas), multi-component deflection of moderate duration (16.4 seconds). Adjacent to anomaly M755, anomalies M741 and M754 are both moderate amplitude (22.5 and 44.0 gammas), monopolar magnetic disturbances with short durations (8.8 and

SURVEY BLOCK 4



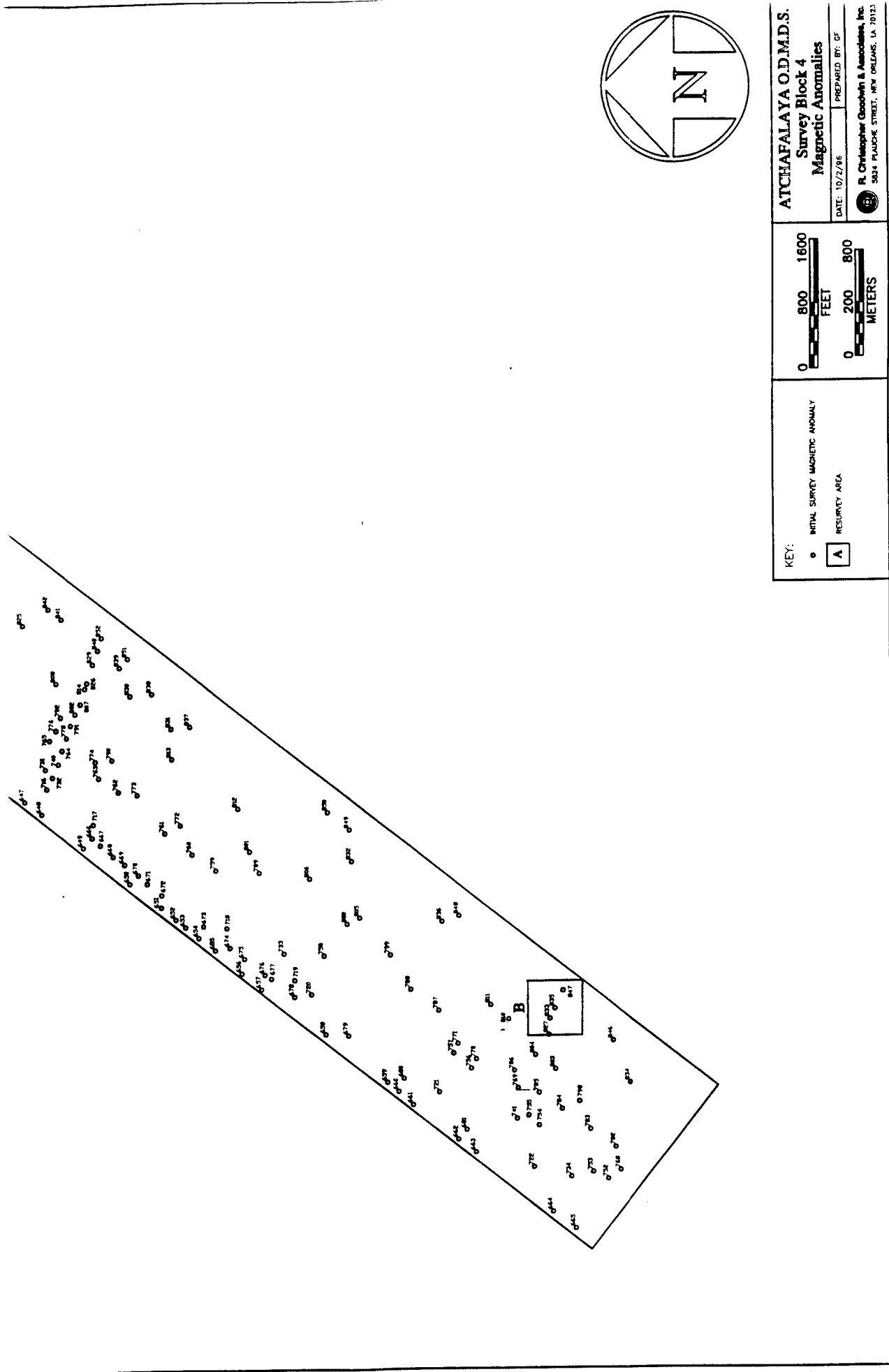


Figure 25. Center points of magnetic anomalies, Block 4

N213000 —

N212000 —

N211000 —

N210000 —

N209000 —

N208000 —

N207000 —

N206000 —

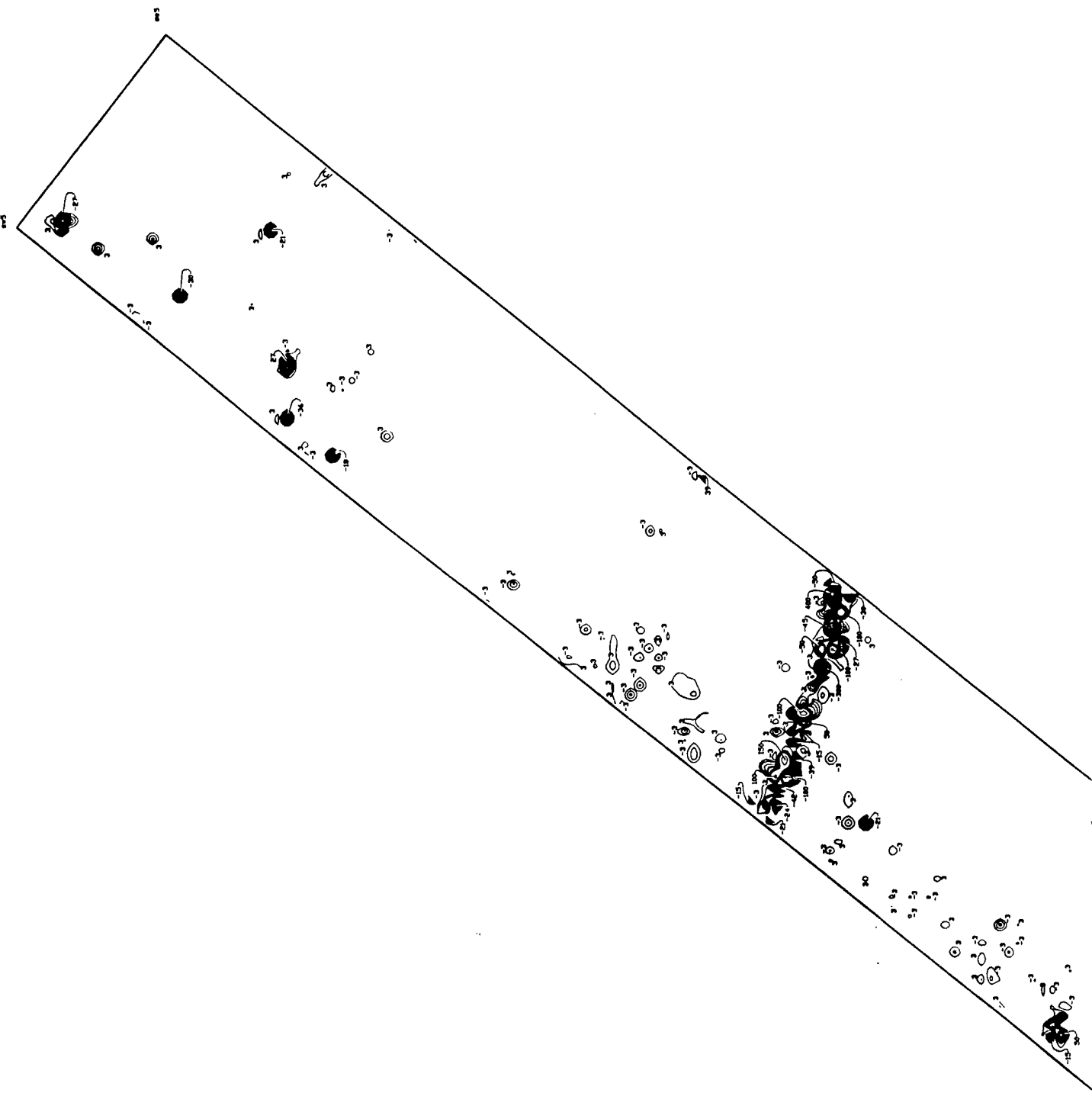
N205000 —

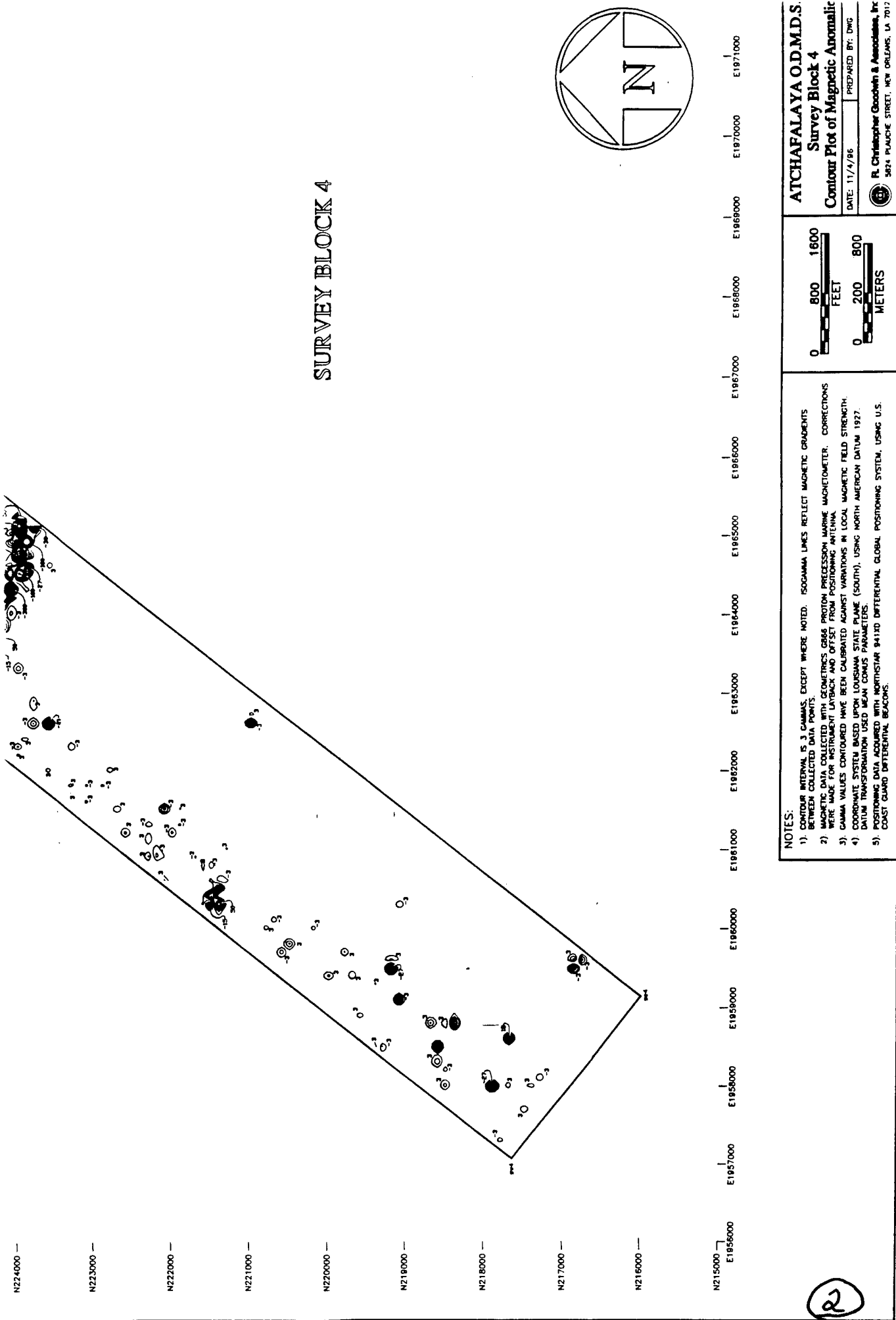
N204000 —

N203000 —

N202000 —

N201000 —





NOTES:

- 1) CONTOUR INTERVAL IS 3 GAMMAS, EXCEPT WHERE NOTED. ISOGAMMA LINES REFLECT MAGNETIC GRADIENTS BETWEEN COLLECTED DATA POINTS.
- 2) MAGNETIC DATA COLLECTED WITH GEOMETRICS 6846 PROTON PRECESSION MARINE MAGNETOMETER. CORRECTIONS WERE MADE FOR INSTRUMENT LAYBACK AND OFFSET FROM POSITIONING ANTENNA.
- 3) GAMMA VALUES CONTOURED HAVE BEEN CALIBRATED AGAINST VARIATIONS IN LOCAL MAGNETIC FIELD STRENGTH.
- 4) COORDINATE SYSTEM BASED UPON LOUISIANA STATE PLANE (SOUTH), USING NORTH AMERICAN DATUM 1927.
- 5) DATUM TRANSFORMATION USED MEAN CONUS PARAMETERS.
- 6) POSITIONING DATA ACQUIRED WITH NORTHSTAR 9410D DIFFERENTIAL GLOBAL POSITIONING SYSTEM, USING U.S. COAST GUARD DIFFERENTIAL BEACONS.

ATCHAFALAYA O.D.M.D.S.

Survey Block 4

Contour Plot of Magnetic Anomaliic

DATE: 11/4/96 PREPARED BY: DMG


 **R. Christopher Goodwin & Associates, Inc.**
5824 PLUCKE STREET, NEW ORLEANS, LA 70112

Figure 26. Contour map of magnetic anomaly gradients, Block 4

Figure 27 is located at the back of this report.

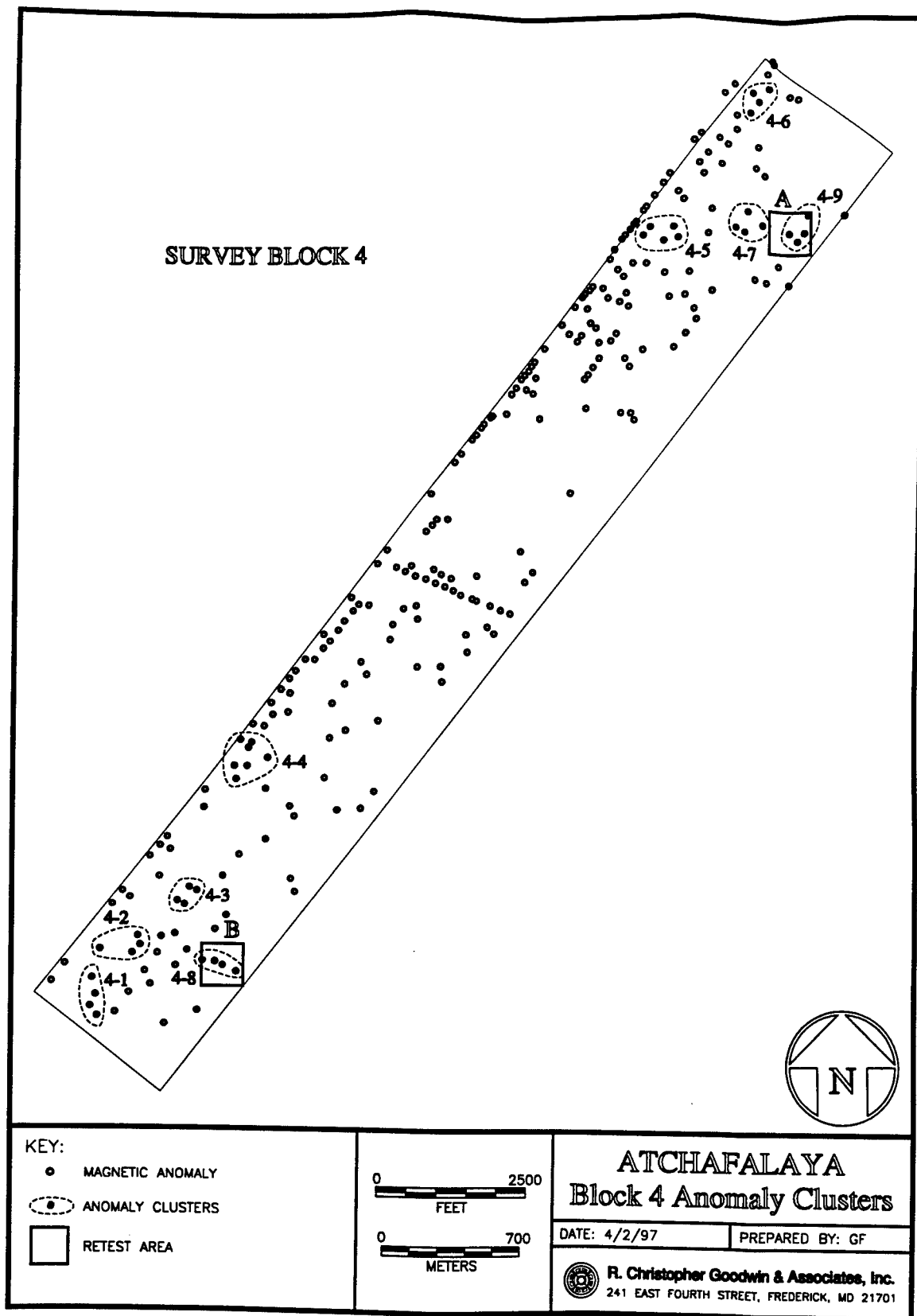


Figure 28. Anomaly clusters, Block 4

3.3 seconds). Located approximately 550 ft (167.69 m) from anomalies M741, M754, and M755 is anomaly M722, a moderately strong (48.5 gammas) multi-component disturbance with a long duration (86.9 seconds). No bathymetric or acoustic anomalies were associated with the magnetic disturbances in Cluster 4-2. The probability that Cluster 4-2 represents a potential cultural resource is moderate.

Cluster 4-3. Cluster 4-3 is comprised of four magnetic anomalies and one bathymetric anomaly: M756, M757, M770, and M771, and B57. Anomaly M770 is a high amplitude (530.0 gamma) multi-component anomaly with a moderate duration (13.8 seconds). Anomalies M756, M757, and M771 are low to moderate amplitude anomalies (13.5, 51.0, and 7.5 gamma) with short to moderate durations (6.0, 19.8, and 4.3 seconds). Correlating with anomaly M771 is bathymetric anomaly B57; a three ft tall peak. No acoustic anomalies are associated with any of the targets comprising Cluster 4-3. The presence of one large multi-component anomaly, associated with several smaller anomalies indicates that Cluster 4-3 has a moderate to high probability of representing a potential submerged cultural resource.

Cluster 4-4. Cluster 4-4 comprises seven magnetic targets: M657, M676, M677, M678, M719, M720, and M733. Anomalies M678, M719, and M733 are all high amplitude (387.5, 152.0, and 231.0 gammas) multi-component anomalies of moderate duration (21.1, 24.1, and 24.1 seconds). Anomalies M657 and M720 are moderate amplitude disturbances (30.5, and 44.5 gammas), with multi-component signatures. Both anomalies M676 and M677 are low amplitude (11.5 and 9.0 gammas), monopolar magnetic perturbations of short duration (4.4 and 2.7 seconds). No bathymetric or acoustic anomalies were associated with the magnetic targets in Cluster 4-4. The presence of several large multi-component targets surrounded by a field of smaller magnetic disturbances indicates that Cluster 4-4 has a moderate to high probability of being a potential submerged cultural resource.

Cluster 4-5. Cluster 4-5 is composed of five magnetic anomalies: M690, M691, M724, M725, and M738. Anomalies M691 and M738 are high amplitude (127.0 and 307.0 gammas) monopolar and dipolar anomalies of short duration (2.7 and 4.4 seconds). Anomalies M690, M724, and M725 are low amplitude (17.0, 13.5, and 13.0 gammas) dipolar anomalies of short duration (4.4, 4.4, and 6.0 seconds). No anomalous acoustic or bathymetric events are associated with the magnetic targets in Cluster 4-5. The very brief duration of the magnetic disturbances comprising Cluster 4-5 indicates that the cluster has a low probability of representing a potential submerged cultural resource.

Cluster 4-6. Cluster 4-6 is comprised of four magnetic anomalies: M684, M699, M700, and M701. Anomaly M699 is a strong (248.0 gammas) monopolar deflection of short duration (3.3 seconds). Anomalies M684, M700, and M701 are all low to moderate strength (33.5, 7.0, and 17.5 gammas) disturbances that are short to moderate in their durations (32.9, 6.0, and 10.4 seconds). No acoustic or bathymetric anomalies are associated with the magnetic targets in Cluster 4-6. The probability of Cluster 4-6 representing a potential submerged cultural resource is low.

Cluster 4-7. Cluster 4-7 consists of three magnetic anomalies: M796, M797, and M819. Anomaly M819 is a high amplitude (232.5 gammas) monopolar target with a short duration (4.4 seconds). Anomalies M796 and M797 are low to moderate amplitude magnetic perturbations (7.0 and 43.5 gammas) of short to moderate duration (7.2 and 16.5 seconds). No acoustic or bathymetric anomalies are associated with the magnetic disturbances forming Cluster 4-7. The monopolarity and short duration of M819, combined with the low to moderate amplitudes of M796 and M797, are indicative that Cluster 4-7 is unlikely to represent a potential submerged cultural resource.

Cluster 4-8. Cluster 4-8 is composed of four magnetic anomalies: M827, M833, M835, and M847. The signatures of these magnetic targets are characteristically similar in that they are all low to moderate in their magnetic amplitude (26.5, 8.5, 65.5, and 39.0 gammas), are monopolar or dipolar, and are short to moderate in their duration (10.5, 13.2, 15.4, and 8.8 seconds). No acoustic or bathymetric anomalies are associated with Cluster 4-8. The probability that Cluster 4-8 represents a potential submerged cultural resource is low to moderate.

Cluster 4-9. Cluster 4-9 is composed of four magnetic anomalies: M844, M845, M855, and M856. Anomaly M844 is a moderate amplitude (30.0 gamma) multi-component disturbance of moderate duration (23.6 seconds). Anomalies M845, M855, and M856 are all low to moderate in amplitude (9.0, 18.5, and 8.0 gammas), and are monopolar or dipolar with short durations (7.7, 6.1, and 3.3 seconds). No acoustic or bathymetric anomalies are associated with the magnetic targets comprising Cluster 4-9. The probability that Cluster 4-9 represents a potential submerged cultural resource is low to moderate.

Other Anomalies. Examination of the magnetic contour plot for Block 4 (Figure 26) clearly reveals the presence of a pipeline running roughly east to west across the center of the block. This feature is comprised of approximately 19 anomalies, M647, M648, M716, M731, M732, M740, M764, M765, M775, M776, M791, M792, M802, M807, M814, M826, M829, M840, and M852.

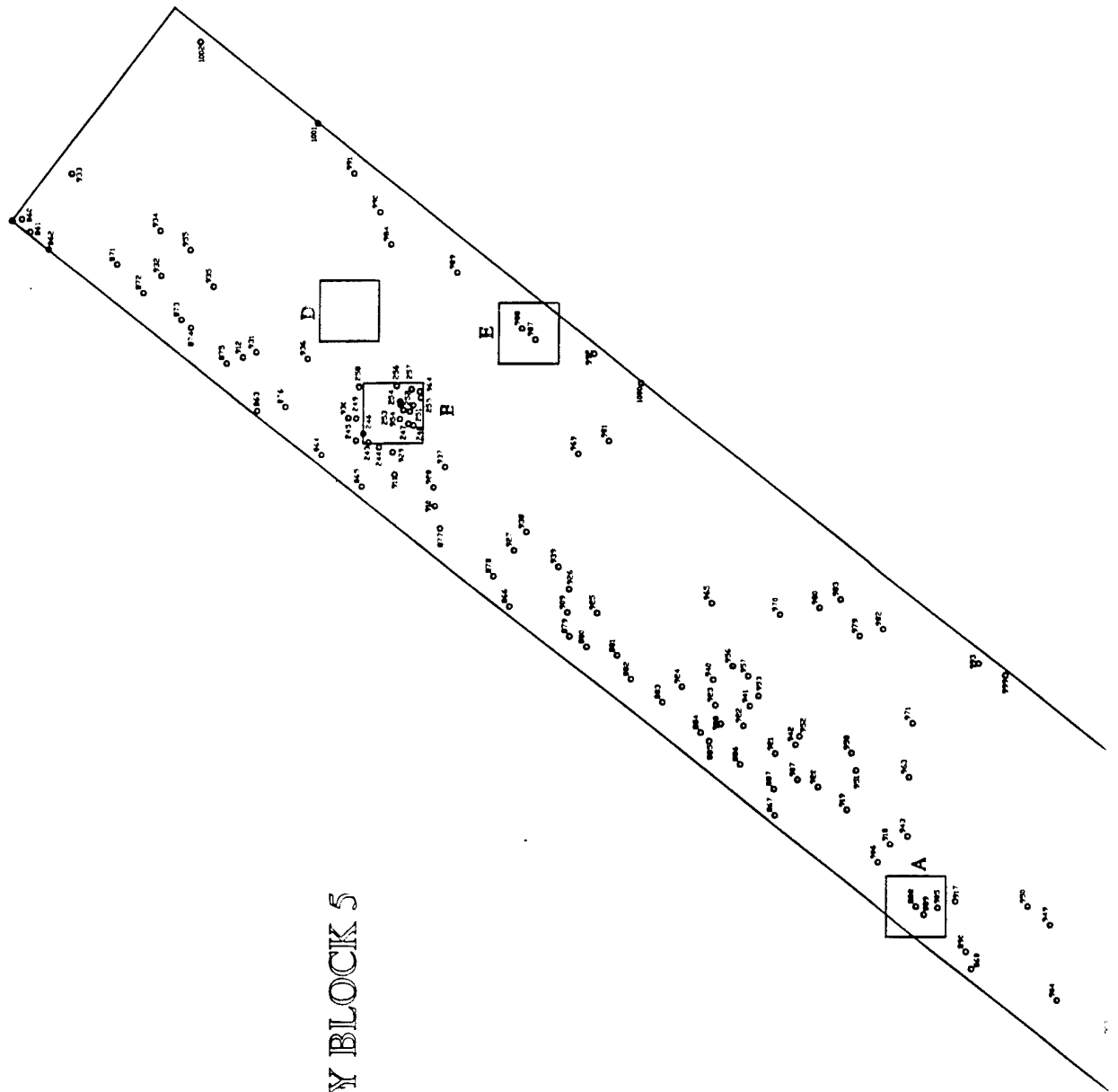
Results of Block 5 Initial Survey Data Analysis

Block 5 contained a total of 142 magnetic anomalies, 4 acoustic anomalies, and 35 bathymetric anomalies (Figures 29 - 31). Analysis of these anomalies revealed that one acoustic anomaly correlated with the magnetic anomalies and 13 bathymetric anomalies correlated with magnetic anomalies. There were no correlations between the acoustic and bathymetric data sets, nor were there any correlations between anomalies from all three of the data sets. Analysis of the magnetic data revealed eight clusters of magnetic anomalies in Block 5 (Figure 32).

Cluster 5-1. Cluster 5-1 is comprised of one anomalous bathymetric target and three magnetic anomalies: B89, M875, M912, and M931. Anomalies M875 and M912 are high amplitude (616.5 and 161.0 gammas) monopolar and dipolar disturbances of short duration (2.7 and 4.4 seconds). Anomaly M875 correlates with bathymetric anomaly B89, which consists of two, adjacent 5 ft (m) deep depressions. Anomaly M931 is a moderately strong (47.0 gammas) multi-component deflection of long duration (53.8 seconds). Not a single acoustic anomaly was recorded in this cluster. The high amplitude of two of the anomalies in this cluster, combined with the long duration and multi-component signature of the third anomaly indicates this cluster has a moderate probability of representing a potential submerged cultural resource.

Cluster 5-2. Cluster 5-2 contains one bathymetric anomaly, one acoustic anomaly, and 21 magnetic targets: M867, M884, M885, M886, M887, M907, M908, M919, M920, M921, M922, M923, M940, M941, M942, M951, M952, M953, M956, M957, M958, B105, and A162. These anomalies are spread over a large area, measuring approximately 7,872 x 5,248 ft (2,400 x 1,600 m). Based upon the strength of their disturbance, the magnetic anomalies in this cluster can be organized into three different categories: high, moderate, and low. Anomalies M867, M886, M887, M908, M919, M921, M941, M942, M951, M952, M956, and M958 are very strong, and have high amplitudes of 313.3, 244.5, 211.0, 105.5, 148.0, 595.0, 533.0, 913.5, 134.5, 134.5, 715.5, and 327.5 gammas, and exhibit a wide range of accompanying signatures. Within this group, eight anomalies are short in their duration (less than 10 seconds), two anomalies are moderate in duration (10-30 seconds), and three are long in duration (more than 30 seconds). Anomalies M884, M885, M907, M920, M922, M923, M940, and M957 have moderate amplitudes (23.5, 26.0, 95.0, 34.5, 25.0, 64.0, 68.5, and 48.0 gammas), and display a variety of accompanying signatures. Among this group, there are four

SURVEY BLOCK 5



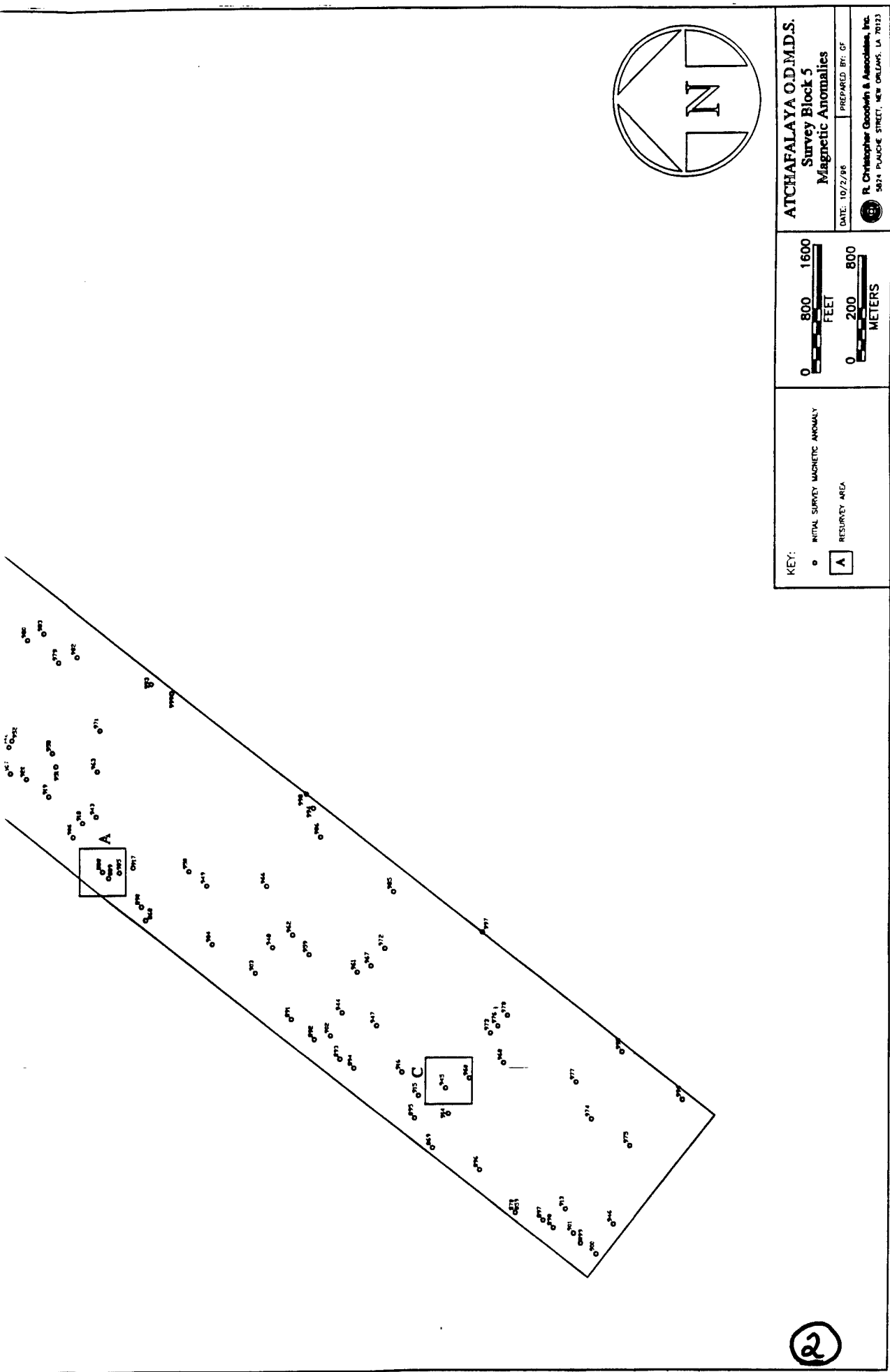


Figure 29. Center points of magnetic anomalies, Block 5

N249000 —

N248000 —

N247000 —

N246000 —

N245000 —

N244000 —

N243000 —

N242000 —

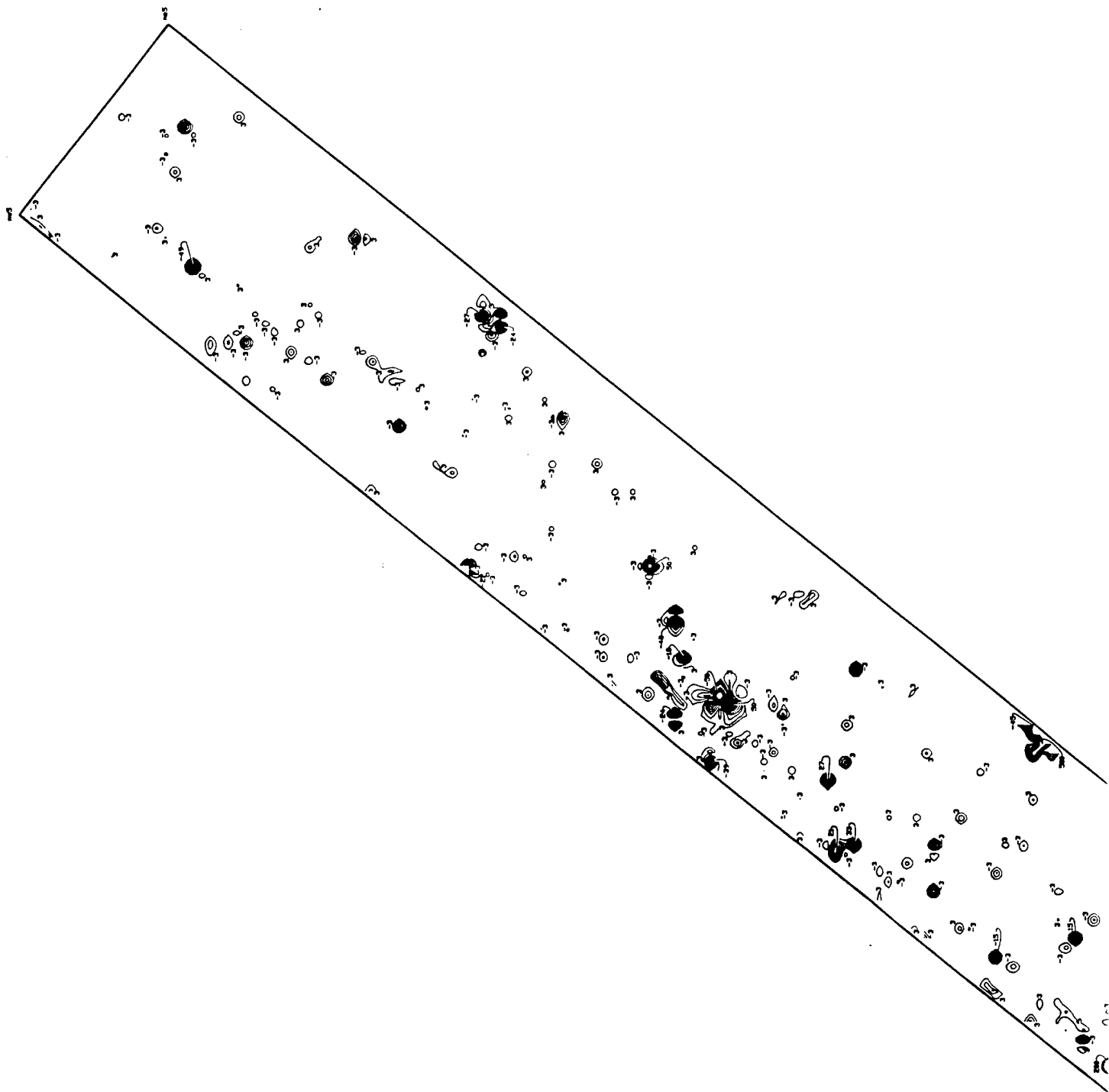
N241000 —

N240000 —

N239000 —

N238000 —

N237000 —



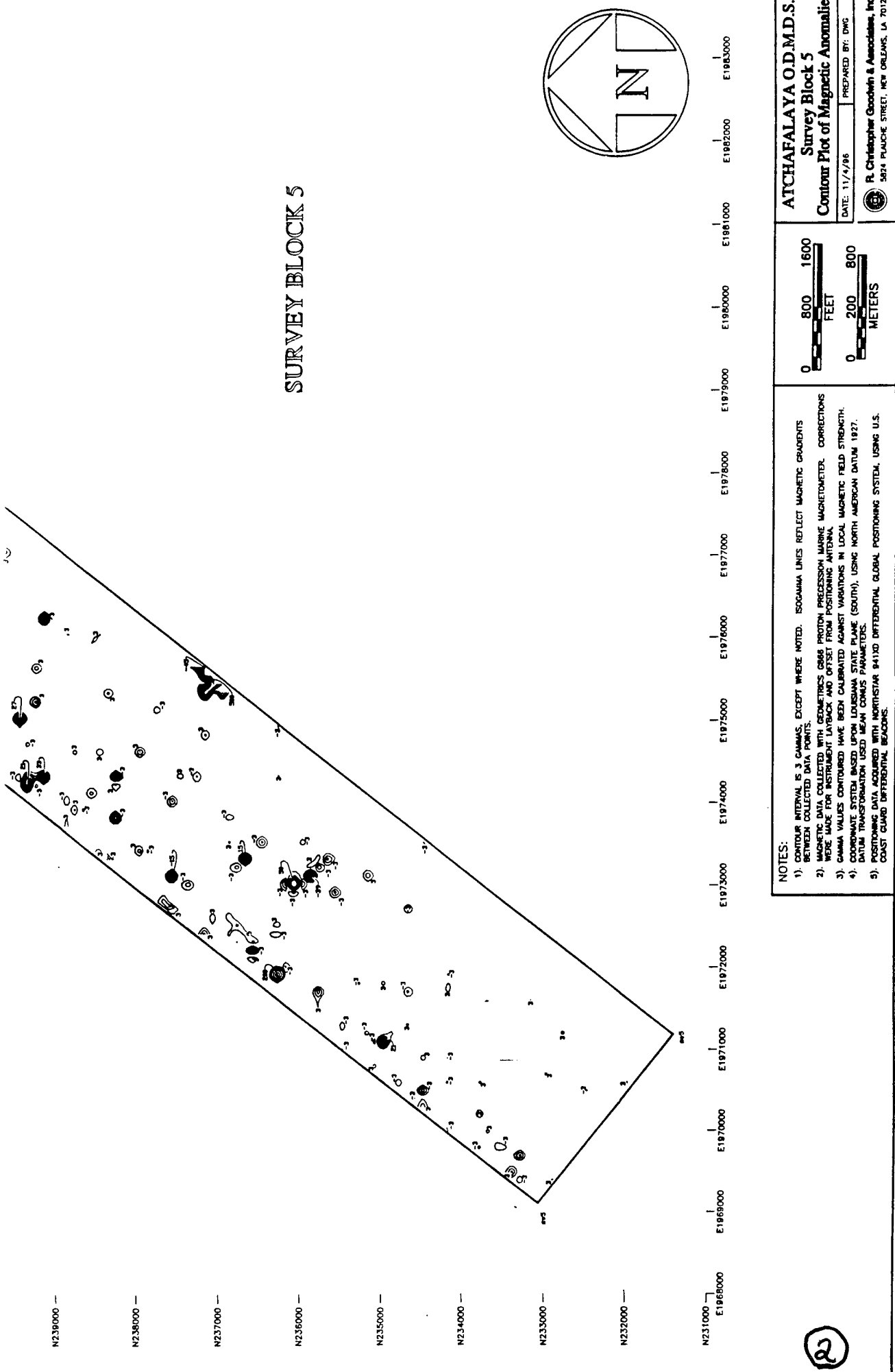


Figure 30. Contour map of magnetic anomaly gradients, Block 5

Figure 31 is located at the back of this report.

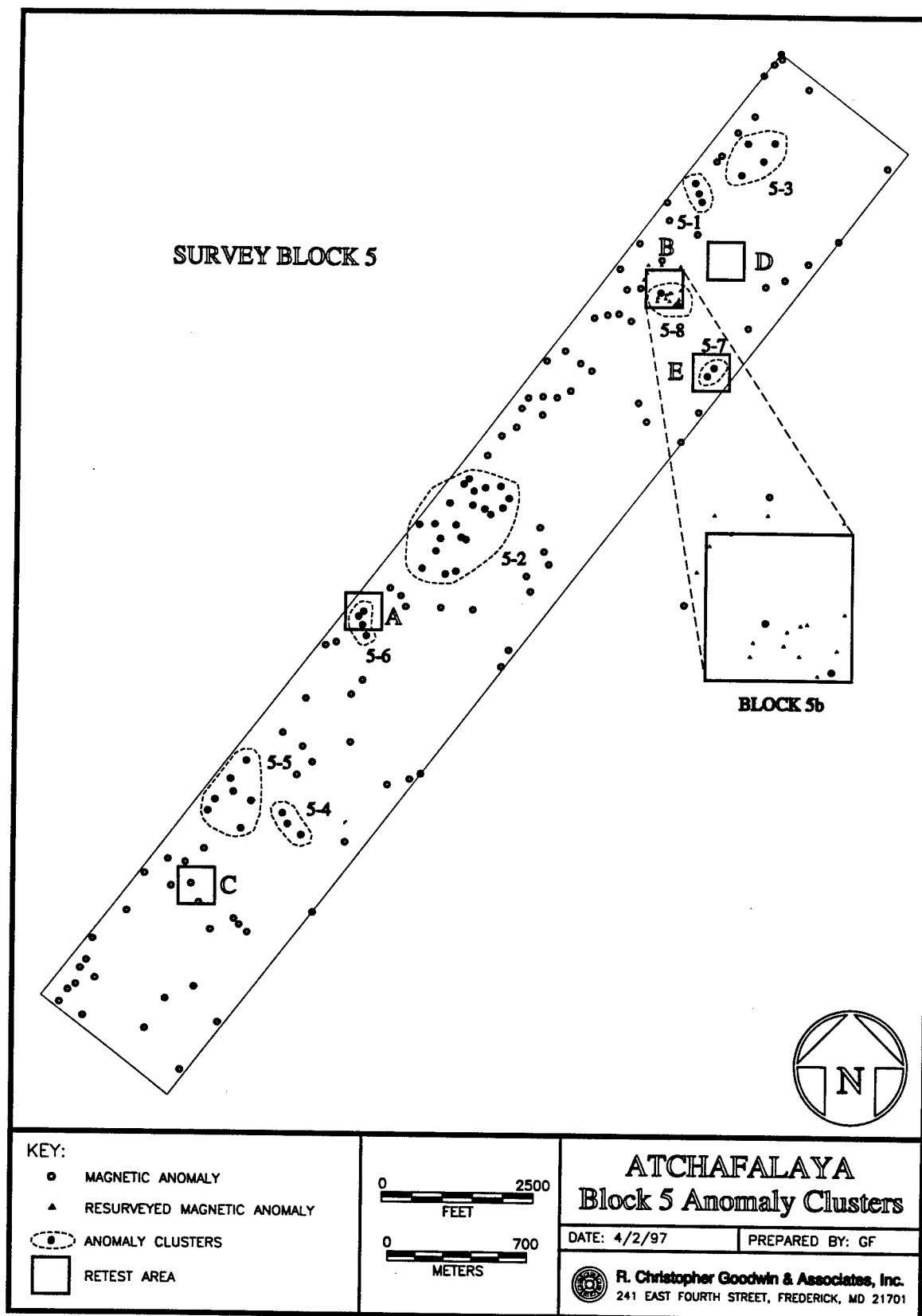


Figure 32. Anomaly clusters, Block 5

anomalies that are short in duration (less than 10 seconds). Two anomalies have moderate durations (10-30 seconds), and one negative, monopolar anomaly has a long duration (30 seconds). Anomaly M953 is a low amplitude (2.7 gammas) monopolar target of moderate duration (29.0 seconds).

Within Cluster 5-2, one acoustic target and one bathymetric anomaly were identified. Bathymetric anomaly B105 correlates with magnetic anomalies M941 and M942. Anomaly B105 appears to be a 3-4 ft (0.92 - 1.22 m) deep depression in the seabed. Acoustic anomaly A162, an area of disturbance on the seafloor, correlates with magnetic anomaly M957.

The magnetic anomalies that form Cluster 5-2 appear to be caused by a large field of ferrous debris that includes many sizeable ferrous objects. The size of the debris field indicates that it is too large in size to be the remains of a single vessel, unless the vessel is highly disintegrated. The probability that Cluster 5-2 represents one or more potential submerged cultural resources is moderate to high.

Cluster 5-3. Cluster 5-3 contains four magnetic anomalies and four bathymetric anomalies: M932, M934, M935, M955, and B109, B110, B111, and B112. The magnetic anomalies have moderately strong amplitudes of 35.5, 52.0, 52.0, and 41.0 gammas, and multi-component and dipolar signatures that are widely variable in duration (7.8, 45.1, 40.6, and 4.4 seconds). Magnetic anomaly M934 correlates with three bathymetric anomalies: B110, B111, and B112. Both anomalies B110 and B111 are 3-4 ft (0.92 - 1.22 m) deep depressions. Anomaly B112 is a slightly more shallow 2-3 ft (0.61 - 0.92 m) deep depression. Bathymetric anomaly B109, which corresponds with magnetic target M935, is also a 2-3 ft (0.61 - 0.92 m) deep depression. No acoustic anomalies were recorded within this cluster. The probability that Cluster 5-3 represents a potential submerged cultural resource is moderate.

Cluster 5-4. Cluster 5-4 consists of three, closely-spaced, magnetic targets: M961, M967, and M972, all of which exhibit high amplitude (718.5, 206.0, and 115.5 gammas) multi-component, dipolar, and monopolar signatures that are short to moderate in their duration (16.4, 7.7, and 7.1 seconds). No acoustic or bathymetric anomalies were recorded within this cluster. The probability that Cluster 5-4 represents a potential submerged cultural resource is moderate to high.

Cluster 5-5. Cluster 5-5 contains seven magnetic anomalies: M891, M892, M893, M894, M902, M944, and M947. Anomalies M892, M893, M902, and M944 are strong, high amplitude perturbations that measured 802.0, 211.0, 100.0, and 121.5 gammas, and that are short in duration (8.8, 6.0, 7.7, and 8.8 seconds). Anomalies M891, M894, and M947 displayed moderate amplitude deflections (68.5, 25.5, and 58.0 gammas), and are variable in duration (73.4, 2.8, and 3.3 seconds). No acoustic or bathymetric anomalies were associated with the magnetic targets in this cluster. The probability that Cluster 5-5 represents a potential submerged cultural resource is moderate.

Cluster 5-6. Cluster 5-6 contains four magnetic anomalies: M888, M889, M905, and M917. Anomalies M888 and M917 produced strong (339.0 and 189.5 gammas) multi-component and dipolar deflections of short and moderate duration (13.2 and 4.4 seconds). Anomalies M889 and M905 are moderate amplitude (23.5 and 91.5 gammas) targets, with multi-component and dipolar signatures of short and moderate duration (4.4 and 13.2 seconds). No acoustic or bathymetric anomalies were recorded within this cluster. The probability that Cluster 5-6 represents a potential submerged cultural resource is moderate.

Cluster 5-7. Cluster 5-7 is composed of two magnetic anomalies: M987 and M988. Both targets produced high amplitude (332.5 and 158.5 gammas) monopolar signatures of short duration (9.3 and 4.3 seconds). No acoustic or bathymetric anomalies were recorded within this cluster. The probability that Cluster 5-7 represents a submerged cultural resource is low.

Cluster 5-8. Cluster 5-8 is a small pair of anomalies, M954 and 964. M954 is a relatively short, positive anomaly (.3 seconds) of moderate amplitude (23.0 gamma). M964 is a much stronger, dipolar disturbance (173.0 gamma) of 7.7 seconds. No bathymetric or acoustic anomalies were found in association with the magnetic anomalies of this cluster. The characteristics of the cluster suggest a low to moderate potential that it represents a cultural resource.

Results from the Detailed Resurvey of Selected Anomalies

Given the very large number of magnetic anomalies found during the initial survey (1,000), a strategy of resurveying every anomaly at a closer interval lane spacing, as requested by the Scope of Work, was not feasible. Therefore, an alternative strategy was devised that targeted specifically those areas that contained clusters of anomalies. Eighteen small blocks were laid out, of which seventeen were surveyed, containing a total of 47 individual anomalies (a 4.7 percent sample) that were recorded during the initial survey. These were surveyed using a 50 ft (15.24 m) interval lane spacing. These resurvey areas or blocks are visible as smaller squares located within the boundaries of the larger initial survey blocks, depicted in Figures 10, 16, 21, 25, and 29. Most of the resurvey blocks measured 600 ft (182.93 m) square, although three were enlarged to 700 ft (213.41 m) square, so that adjacent anomalies would be included in the resurvey, and one smaller area measuring 300 ft (91.46) square was surveyed.

To provide broad coverage of the entire study area, areas chosen for the resurvey were relatively evenly distributed between the five, larger, initial survey Blocks: three in Block 1; three in Block 2; four in Block 3; two in Block 4; and five in Block 5 (Table 2). An attempt was made to include a variety of cluster types in the sample, ranging from high to lower probability, and clusters with large and small numbers of anomalies. As a control, one resurvey square (Block 5E) was placed in an area where no anomalies were detected during the initial survey. Each of the resurvey blocks was given a letter designator that follows the larger block number (e.g. Block 1A, Block 1B, Block 2A, etc.).

A total of 307 magnetic anomalies were identified during the resurvey of smaller blocks; some of these are anomalies identified during the original survey, while many are new anomalies detected only during resurvey. In order to more easily differentiate between anomalies recorded during the initial survey and those recorded during the resurveys, magnetic, acoustic, and bathymetric anomalies recorded during the resurvey phase of the fieldwork were given the letter designator R before their target number, for example RM-112, RA-112, and RB-112. Appendices V, VI, and VII contain an inventory and descriptive data for the acoustic, bathymetric, and magnetic anomalies recorded during the resurvey, respectively.

The density of information contained in plots of resurvey areas makes them all but illegible and as will become apparent from discussions such plots add little to the conclusions and recommendations resulting from this study. Therefore a plot of magnetic anomalies from only one resurvey area has been included here, that of Resurvey Area 5B (see Figure 29; anomalies from the resurvey are numbered in the "200" series).

Relatively few acoustic anomalies were detected during the resurvey (Appendix V). None were encountered in the Block 1 resurvey areas; one target was encountered in Block 2B; five in Block 2D; one each in Blocks 3B and 3C; three in Block 3D; none in Block 4; one in Block 5B; and one in Block 5C. Among these thirteen acoustic anomalies, three are likely to represent natural features (RA7, RA8, and RA12), and one (RA10) probably is a pipeline. None are obviously related to shipwreck remains.

**TABLE 2. LOCATION AND SIZE OF RESURVEY BLOCKS. XY COORDINATES
AT CENTER POINT OF BLOCK (LOUISIANA STATE PLANE [SOUTH] COORDINATES
IN FT [NAD-27])**

BLOCK NUMBER	X COORDINATE	Y COORDINATE	BLOCK DIMENSIONS
1A	1,924,359.3	173,023.3	600 ft x 600 ft
1B	1,925,132.8	173,626.0	600 ft x 600 ft
1C	1,929,762.8	180,393.3	600 ft x 600 ft
2A	1,940,830.9	195,412.4	700 ft x 700 ft
2B	1,934,627.1	188,246.1	600 ft x 600 ft
2C	NOT SURVEYED	NOT SURVEYED	NOT SURVEYED
2D	1,937,204.7	190,498.3	600 ft x 600 ft
3A	1,946,426.5	203,879.1	600 ft x 600 ft
3B	1,948,234.4	204,894.5	600 ft x 600 ft
3C	1,954,248.8	211,064.5	300 ft x 300 ft
3D	1,949,623.8	204,830.4	600 ft x 600 ft
4A	1,969,529.6	230,178.7	700 ft x 700 ft
4B	1,960,162.0	218,122.3	700 ft x 700 ft
5A	1,974,328.2	239,380.1	600 ft x 600 ft
5B	1,979,232.3	244,666.7	600 ft x 600 ft
5C	1,972,229.2	234,888.4	600 ft x 600 ft
5D	1,980,237.6	245,116.8	600 ft x 600 ft
5E	1,980,015.1	243,312.1	600 ft x 600 ft

A total of 24 bathymetric anomalies were detected during the resurvey of the smaller blocks (Appendix VI), two of which were erratic readings from the fathometer due to choppy seas, yielding a total of 22 anomalies which are potentially significant.

Conditions during the resurvey were such that probing of selected anomalies could not be undertaken, and was completely precluded in the deeper water at the southern end of the project area. Even under the best of circumstances in the shallower waters probing would have been difficult, but the rough seas and unsettled weather that prevailed during the resurvey made the process prohibitively dangerous. Furthermore, probing would have been only minimally informative because of the rapid sedimentation rates in the project area, as indicated by the geomorphic background research, which suggests that historic period shipwrecks lie buried deeply beneath the rapidly aggrading surface of the seafloor.

Results of Block 1 Resurvey Data Analysis

Resurvey Area 1A. Resurvey Area 1A contains 14 magnetic and 5 bathymetric anomalies. The magnetic anomalies in Resurvey Area 1A have moderate amplitudes and, with the exception of RM10, are all multicomponent. Three of the magnetic anomalies, RM3, RM5 and RM13, correlate with bathymetric anomalies. No acoustic targets are located in Resurvey Area A1. Given the amplitudes of the magnetic anomalies (with a mean of 43.3 gamma) and their relatively long durations (a mean of 64.8 seconds), Resurvey Area 1A has a moderate potential for containing submerged cultural resources.

Resurvey Area 1B. Resurvey Area 1B contains 13 magnetic and 2 bathymetric anomalies. The magnetic anomalies in Resurvey Area 1B have moderate amplitudes (mean of 41.27 gamma) and multicomponent signatures, again of long duration (mean of 83 seconds). Two of the magnetic anomalies, RM17 and RM18, correlate with bathymetric anomalies. No acoustic targets are located in Resurvey Area A2. The area has a moderate potential to contain submerged cultural resources.

Resurvey Area 1C. Resurvey Area 1C contains 17 magnetic and 2 bathymetric anomalies. The magnetic anomalies in Resurvey Area 1C have low to moderate amplitudes (mean of 28.44 gamma; mean duration of 42.7 seconds), with a variety of signatures. No acoustic targets are located in Resurvey Area 1C. The signature characteristics and patterning of these anomalies suggest a low to moderate potential for cultural resources within Resurvey Area 1C.

Results of Block 2 Resurvey Data Analysis

Resurvey Area 2A. Resurvey area 2A contains 25 magnetic and 1 bathymetric anomaly. The magnetic anomalies in Resurvey Area 2A have low to moderate amplitudes with a variety of signatures. Mean anomaly amplitude was 30.3 gamma, with a mean duration of 36.3 seconds (range of 2.7 to 114.2 seconds). No acoustic targets are located in Resurvey Area 2A, which has a low to moderate potential for cultural resources.

Resurvey Area 2B. Resurvey Area 2B contains 22 magnetic anomalies and 1 acoustic target. The magnetic anomalies in Resurvey Area 2B have low to moderate amplitudes (32.23 gamma mean) with a variety of signatures (mean duration of 27.6 seconds). Acoustic anomaly RA1, an oblong anomaly, does not correlate with any magnetic anomalies. Resurvey Area 2B has a moderate potential for cultural resources.

Resurvey Area C. This area was not surveyed.

Resurvey Area 2D. Resurvey area 2D contains 12 magnetic, 4 bathymetric and 5 acoustic anomalies. The magnetic anomalies in Resurvey Area 2D have low to moderate amplitudes (37.79 gamma mean; 44.8 second mean duration) with a variety of signatures. Acoustic anomaly RA6, a 40ft wide oblong anomaly, correlates with magnetic anomaly RM98. Bathymetric anomaly RB12, a 5 ft deep depression, correlates with magnetic anomaly RM97. The magnetic, acoustic, and bathymetric anomalies in this area suggest a moderate potential for submerged cultural resources.

Results of Block 3 Resurvey Areas Data Analysis

Resurvey Area 3A. Resurvey Area 3A contains 26 magnetic and 5 bathymetric anomalies. The magnetic anomalies in the area 3A have low to high amplitudes (40.75 gamma mean) with shorter durations than Area 2D (14.8 second mean) and a variety of signatures. Three bathymetric anomalies, RB16, RB18, and RB19, correlate with magnetic anomalies. No acoustic targets were located within Resurvey Area 3A. The signatures and distributions of the magnetic and bathymetric targets suggest a low to moderate likelihood of submerged cultural resources.

Resurvey Area 3B. Resurvey Area 3B contains 26 magnetic, 1 acoustic and 2 bathymetric anomalies. The magnetic anomalies in Resurvey Area 3B have low to high amplitudes with a variety of signatures. Acoustic anomaly RA7, 2 faint linear anomalies, correlates with magnetic anomalies RM144 and RM145. Bathymetric anomalies RB21 and RB21, 4-5 ft deep depressions, correlate with magnetic anomalies RM144 and RM145.

Resurvey Area 3B contains a potentially significant cluster of 5 magnetic anomalies: RM149, RM150, RM151, RM152, and RM153. This cluster is centered around anomalies RM149 and RM151. These are high amplitude monopolar magnetic disturbances with short and moderate durations. Anomalies RM150, RM152, and RM153 are smaller anomalies surrounding RM149 and RM151. The distribution of this cluster is consistent with that of one or more large ferrous objects with a surrounding debris field. This cluster has a moderate to high probability of representing a submerged cultural resource.

Resurvey Area 3C. Resurvey Area 3C contains 8 magnetic and one acoustic anomaly. The magnetic anomalies in Resurvey area 3C have low to high amplitudes with a variety of signatures. Acoustic anomaly RA8, a curvilinear acoustic feature, does not correlate to any magnetic disturbances. No bathymetric anomalies were located within Resurvey Area 3C.

Resurvey Area 3C contains a potentially significant cluster of 3 magnetic anomalies: RM161, RM162, and RM163. The center of the disturbance, RM163, is a high amplitude (3314.5 gammas) dipolar magnetic perturbation of moderate duration. The two surrounding magnetic anomalies, RM161 and RM162, are medium and high amplitude magnetic disturbances (317.0 and 71.0 gammas) with dipolar and multicomponent signatures and moderate durations. The distribution of this cluster is consistent with that of a very large ferrous object with a surrounding debris field. This cluster has a moderate to high probability of representing a submerged cultural resource.

Resurvey Area 3D. Resurvey Area 3D contains 16 magnetic and 3 acoustic anomalies. The magnetic anomalies in Resurvey Area 3D have low to high amplitudes with a variety of signatures. Acoustic anomaly RA 9, 2 adjacent oblong anomalies, correlates with magnetic anomaly RM165. Acoustic anomaly RA10, a linear anomaly, correlates with magnetic anomaly RM167. Acoustic anomaly RA11, a long linear anomaly, does not have a correlating magnetic disturbance.

Resurvey Area 3D contains a potentially significant cluster of 4 magnetic anomalies. Magnetic anomalies RM170, RM171, and RM172 are high amplitude (850.0, 126.0, and 355.5 gammas) multicomponent magnetic perturbations with moderate durations. Magnetic anomaly

RM169 is a moderate amplitude (53.5 gammas) multicomponent magnetic anomaly of moderate duration. The distribution of cluster 3D-1 indicates a tight cluster of several very large ferrous objects. This cluster within Area 3D has a moderate to high probability of representing a submerged cultural resource.

Resurvey Area 4A. Resurvey Area 4A contains 20 magnetic anomalies. The magnetic anomalies in Resurvey Area 4A have low to high amplitudes with a variety of signatures. Some anomalies are quite strong, but of limited duration (RM180, 200.5 gamma for 3.3 seconds; RM 188, 138.0 gamma for 4.4 seconds; RM190, 668.0 gamma for 7.1 seconds). No acoustic or bathymetric targets are located within Resurvey Area 4A. The relatively brief duration of the magnetic anomalies combines with their patterning to suggest a low to moderate probability for the presence of cultural resources.

Resurvey Area 4B. Resurvey area 4B contains 19 magnetic anomalies. These magnetic anomalies have low to high amplitudes with a variety of signatures. Two bathymetric anomalies are located in Resurvey Area 4B. Bathymetric anomaly RB22 is a 10 ft deep depression. Bathymetric anomaly RB23 is a 12-13 ft deep depression. No correlations occur between bathymetric and magnetic anomalies. The distribution of magnetic anomalies within Resurvey Area 4B is not consistent with that of a submerged cultural resource, and the area's potential for cultural resources is rated as low.

Resurvey Area 5A. Resurvey Area 5A contains 24 magnetic and 1 bathymetric anomaly. These magnetic anomalies have low to high amplitudes (range of 9.5 gamma to 122.5 gamma) with a variety of signatures (durations range from 2.5 to 26.9 seconds, with a mean of 7.1). Bathymetric anomaly RB24 is a 3-4 ft deep depression. Bathymetric anomaly RB24 correlates with magnetic anomaly RM232; a moderate amplitude (58.5 gammas) monopolar anomaly of short duration. The distribution of the magnetic and bathymetric anomalies within Resurvey Area 5A is not consistent with that of a submerged cultural resource, and it is assessed as low in cultural resource potential.

Resurvey Area 5B. Resurvey Area 5B contains 16 magnetic (plotted on Figure 29 - the "RM" designation has been omitted due to the density of data, but resurvey magnetic anomalies may be distinguished by the fact that each is in the 200 series) and 1 acoustic anomaly. These magnetic anomalies have low to high amplitudes with a variety of signatures. Acoustic anomaly RA12 is a 20 ft long linear anomaly. No correlations occur between acoustic and magnetic anomalies.

Resurvey Area 5B contains a potentially significant cluster of 5 magnetic anomalies. Anomalies RM250, RM251, and RM253 are high amplitude (770.0, 1599.0, and 207.0 gammas) multicomponent magnetic disturbances with short to moderate durations. Anomaly RM252 is a high amplitude (138.0 gammas) monopolar anomaly of short duration. Anomaly RM254 is a moderate amplitude (49.0 gammas) multicomponent anomaly of short duration. The distribution of these anomalies indicates a tight cluster of several large ferrous objects. This locus has a moderate to high probability of representing a submerged cultural resource.

Resurvey Area 5C. Resurvey Area 5C contains 16 magnetic and 1 acoustic anomaly. These magnetic anomalies have low to high amplitudes with a variety of signatures; with the exception of one large amplitude anomaly of 308.5 gamma, these disturbances range between 9.0 and 28.6 gamma. Acoustic anomaly RA13, a series of adjacent scour-like linear depressions, correlates with magnetic anomaly RM262. The character of the magnetic and acoustic anomalies within Resurvey Area 5C suggests a low to moderate potential for the presence of submerged cultural resources.

Resurvey Area 5D. Resurvey Area 5D contains 15 magnetic anomalies. These magnetic anomalies have low to high amplitudes with a variety of signatures (mean amplitude of 31.47 gamma, most of short duration). No acoustic or bathymetric anomalies are located within Resurvey

Area 5D, and the area may be characterized as low to moderate in potential for submerged cultural resources.

Resurvey Area 5E. Resurvey Area 5E contains 18 magnetic anomalies. These magnetic anomalies have low to high amplitudes with a variety of signatures. No acoustic or bathymetric anomalies are located within Resurvey Area 5D.

Resurvey Area 5E contains a potentially significant cluster of 11 magnetic anomalies. This cluster can be separated into 3 distinct loci. The first and largest locus is composed of magnetic anomalies RM297, RM298, RM301, RM302, RM304, and RM305. Anomalies RM297, RM298, RM301, RM302, and RM304 are high amplitude (145.5, 320.5, 2817.5, 595.0, and 2661.0 gammas) monopolar and dipolar magnetic disturbances of short duration. Anomaly RM305 is a moderate amplitude (41.0 gammas) magnetic disturbance of moderate duration.

The second locus within the cluster contains 4 magnetic anomalies. Anomaly RM299 is a high amplitude (745.0 gammas) monopolar magnetic disturbance of short duration. Magnetic anomalies RM294, RM296, and RM300 are moderate amplitude (27.5, 29.0, and 36.0 gammas) monopolar, multicomponent, and dipolar anomalies of short to moderate duration.

The third locus contains one magnetic anomaly. Anomaly RM303 is a high amplitude (692.5 gammas) monopolar magnetic perturbation of short duration. The distribution of the magnetic anomalies within Cluster 5E-1 indicates the presence of at least 3 large ferrous objects. The probability that these loci are related is high, and the cluster has a relatively high potential for representing a submerged cultural resource.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

This report presents the results of a Phase I remote sensing submerged cultural resource investigation undertaken by R. Christopher Goodwin & Associates, Inc. on behalf of the U.S. Army Corps of Engineers, New Orleans District (USACE-NOD), in support of the proposed establishment of an Ocean Dredged Material Disposal Site (ODMDS) on the east side of the Atchafalaya River Bar Channel, in coastal Louisiana, between Terrebonne and St. Mary Parishes. The Atchafalaya ODMDS survey encompassed an area measuring 0.5 mi (0.85 km) wide x 19.3 mi (31.06) long. The primary objectives of the investigations were to locate and identify specific features or clusters of features within the project area that might represent potentially significant submerged cultural resources and to assess how these resources might be affected by the proposed deposition of dredged materials over them.

Methods

The objectives of the study were met through a combination of archival and archeological research. Background archival investigations were conducted to determine the area's archeological potential and to create a site-specific context for it. Archival documents and results from previous investigations were reviewed to establish a chronological sequence of shoreline changes and to assess sedimentation rates in the vicinity of the mouth of the Atchafalaya River. Also, secondary sources were consulted for background information pertaining to historic maritime activity in coastal Louisiana and, in particular, in the vicinity of the Atchafalaya River.

Archeological investigations, conducted during the months of June, July, and August 1996, consisted of a controlled remote sensing marine survey, utilizing a digitally-integrated system of electronic surveying equipment. The instrument array included a magnetometer, a side scan sonar, and a fathometer towed along lanes spaced 160 ft (48.78 m) apart, with positioning controls provided by DGPS and a computer-based navigation and survey system. Acoustic, bathymetric, and magnetic data from the survey were post-processed, analyzed, inventoried, and correlated. In addition, detected anomalies were plotted graphically to assist in determining whether or not they represented potentially significant cultural resources warranting further investigation. A sample of anomalies and anomaly clusters that exhibited characteristics that made them appear potentially significant were subjected to additional surveying, during which a more refined methodology was employed, with more tightly spaced survey transects at 50 ft (15.24 m) intervals, to generate more detailed information on each targets' configuration and complexity.

Survey Results

The magnetometer, side scan sonar, and bathymetric survey revealed a much larger number of anomalies than anticipated in the project's Scope of Work and research design. In the initial survey, a total of 1,000 magnetic anomalies were identified, along with 165 sonar or acoustic targets and 119 bathymetric anomalies, distributed across the survey blocks as follows:

Block 1 - 61 magnetic anomalies; 45 sonar targets; 1 bathymetric anomalies;
Block 2 - 142 magnetic anomalies; 96 sonar targets; 10 bathymetric anomalies;
Block 3 - 403 magnetic anomalies; 7 sonar targets; 36 bathymetric anomalies;
Block 4 - 252 magnetic anomalies; 13 sonar targets; 37 bathymetric anomalies;
Block 5 - 142 magnetic anomalies; 4 sonar targets; 35 bathymetric anomalies.

Magnetic anomalies were particularly numerous, and many are related to the extensive oil and gas field activity in and around the project area. Although the strength and duration of some of these disturbances, particularly from pipelines and platforms, can effectively mask smaller magnetic anomalies caused by potential submerged cultural resources, it was possible to screen out some scattered, low amplitude anomalies, and isolated, brief, high amplitude signatures that were likely to have been caused by debris associated with oilfield activity. However, the larger number of magnetic anomalies in Block 3 is curious, in that it contains fewer pipelines and platforms than some adjacent blocks. It is likely that the increased frequency is due primarily to the heavy modern boat traffic through the block, the result of vessels cutting into the main channel before the water shoals to the north.

Analysis of the three data sets from the initial survey identified 39 clusters of anomalies that had a higher potential for representing submerged cultural resources than the single, isolated anomalies found elsewhere in the project area. These clusters were in turn evaluated according to their probable potential, ranging from lower to high potential (Table 1).

Subsequent to the initial survey, 17 smaller blocks were chosen for resurvey. These small resurvey blocks (Table 2) included anomaly clusters which ranged from lower to high potential for containing cultural resources; as a control, one block (Resurvey Block 5E) encompassed an area in which no anomalies were detected during the initial survey.

In the resurvey effort, relatively few new side scan sonar and bathymetric anomalies were detected, but a significantly larger number of magnetic anomalies were encountered, 307, as opposed to the 47 detected during the initial remote sensing (Table 3).

The emergence of previously undetected anomalies in the small blocks is not unexpected, simply because anomaly detection is a function of lane spacing and the resulting distance between the magnetometer sensor and the target. The magnetic intensity of an anomaly, as measured by a magnetometer, varies as the inverse cube of the distance (Green 1990:44). In other words, if variables other than distance are kept constant, then the magnitude of an anomaly will vary as $1/d^3$, where d is the distance between the sensor and the anomaly source. For example, if a target 50 ft (15.24 m) away from the magnetometer sensor is detected as a 32 gamma anomaly, then at a distance of 100 ft (30.49 m), the magnitude of the anomaly will be reduced to 4 gammas (Weymouth 1986:344); at 150 ft (45.73 m). Consequently, it would be lost in background noise (it takes a mass of iron weighing approximately one ton to generate a 32 gamma anomaly at a distance of 50 ft [15.24 m] [derived from Breiner 1973:43]).

Clearly, survey lane spacing is a critical element of survey design. A survey lane interval of 160 ft (48.78 m) will detect larger anomalies effectively, particularly if they are close to the vessel track, but it will not detect smaller or even moderate amplitude anomalies that may lie equidistant between the centerlines of two adjacent lanes. This point is driven home by the fact that in Resurvey Block 5E, used as a control, 18 magnetic anomalies were detected at the 50 ft (15.24 m) interval, while none were discerned at the 160 ft (48.78 m) lane spacing.

Based on the seventeen blocks resurveyed in this project, it is estimated that just over 6,500 anomalies would have been detected within the project area as a whole if it had been surveyed at a lane interval of 50 ft (15.24 m). Combined with the discussions above, this projection strongly

**TABLE 3. COMPARISON OF THE NUMBER OF ANOMALIES FOUND IN
50 FT (15.24 M) LANE SURVEY OF RESURVEY BLOCKS WITH THE NUMBER OF ANOMALIES
FOUND AT 160 FT (48.78 M) LANE SPACING**

RESURVEY BLOCK NUMBER	ANOMALIES AT 160 FT (48.78 M) LANE SPACING	ANOMALIES AT 50 FT (15.24 M) LANE SPACING
1A	2	14
1B	2	13
1C	1	17
2A	6	25
2B	3	22
2D	3	12
3A	4	26
3B	4	26
3C	2	8
3D	3	16
4A	4	20
4B	4	19
5A	3	24
5B	2	16
5C	2	16
5D	2	15
5E	0	18
TOTAL	47	307

suggests that a survey interval of 160 ft (48.78 m) is inadequate for future surveys in the region, running the risk of detecting only one-sixth of the anomalies that would be detected with a survey conducted along lines spaced 50 ft (15.24 m) apart. Given the relatively small ferrous masses that are likely to be associated with coastal and small vernacular vessels of the Gulf (ground tackle and hardware much smaller than one ton), 50 ft (15.24 m) lane spacing would be more reliable.

Densities of magnetic anomalies in the project area were highest in proximity to the dredged shipping channel and existing oil platforms, suggesting that many anomalies were generated by modern ferrous trash associated with these modern features. Given the absence of clearly demonstrated and reliable shipwreck "signatures" in the literature, accurate identification of anomalies is impossible without extensive ground-truthing by divers. The density of anomalies in resurvey blocks also seems higher than normal, but the paucity of reported surveys at this interval in the Gulf of Mexico makes this equally difficult to verify.

Despite these qualifications, the results of the follow-up survey were used to assess the potential of each resurvey area for containing archeological resources. These assessments are summarized in Table 4.

Bathymetry reveals substantial shoaling of waters during the last 50 to 60 years in portions of the survey area. Compared with depths on NOAA Chart 11351 *Point au Fer to Marsh Island* (rev. ed. 1991), which are derived from 1935 soundings, this survey delineates some significant variations. In the southern end of Block 1, itself the southernmost survey area, depths are little different than those charted. However, in the northern end of the block, the water is between 2 and 3 ft (0.61 - 0.91 m) shallower today than in 1935. Blocks 2 and 3 (the latter of which contains the largest number of magnetic anomalies) exhibit even greater shoaling, with water depths ranging from 3 to 9 ft (0.91 - 2.74 m) shallower than charted. Depths in Blocks 4 and 5 are 3 to 4 ft (0.91 - 1.22 m) shallower. These data suggest that the presumption of continued and significant sedimentation gulfward of the Point au Fer Shell Reef since 1935, posited in Chapter III, is correct.

Conclusions and Recommendations

Many of the anomalies detected during the survey of the Atchafalaya ODMDS appear to result from pipelines, oil platforms, and debris associated with oil and gas field activity. Many other anomalies, particularly those clustered along the western edge of the study area, are probably the result of redeposited debris from earlier dredging operations. These secondary contexts are unlikely to hold any significant remains; if they are deposited above earlier and potentially significant resources, those older remains would be difficult to discriminate, using current remote sensing technology.

Other anomalies, particularly those in the clusters evaluated as moderate to high in potential for cultural resources, and those in the resurvey blocks rated as moderate to high in potential, may represent significant resources; evaluation of these potential resources is not possible without some sort of diver inspection or groundtruthing. However, the need for such evaluation is limited by the anticipated impacts of the Atchafalaya ODMDS undertaking.

This study was undertaken because of the potential impact from deposition of dredged materials within the project area. Two potentially adverse impacts to shipwrecks from dredge disposal were identified. The first is the distortion or breakage of vessel structure due the increased weight of dredged sediments over the remains. The second potential impact lies in the burial of site components beneath dredged sediment and a possible resultant increase in the rate of decay of those components. The environmental background research presented above, combined with the results of the bathymetric survey, have a direct bearing on these anticipated impacts.

TABLE 4. ASSESSMENT OF CULTURAL RESOURCE POTENTIAL OF RESURVEY BLOCKS

Resurvey Area	Probability of Submerged Cultural Resources
Block 1A	Moderate
Block 1B	Moderate
Block 1C	Low to moderate
Block 2A	Low to moderate
Block 2B	Moderate
Block 2C	Not surveyed
Block 2D	Moderate
Block 3A	Low to moderate
Block 3B	High
Block 3C	Moderate to high
Block 3D	Moderate to high
Block 4A	Low to moderate
Block 4B	Low
Block 5A	Low
Block 5B	Moderate to high
Block 5C	Low to moderate
Block 5D	Low to moderate
Block 5E	High

Beginning with the historic clearing of the Red River logjams in 1839, a heavy deposition of sediment began in the project area. Between 1839 and 1890, 6.5 to 10 ft (1.98 - 3.05 m) of sediment was dumped gulfward of the Point au Fer Shell Reef. Between 1890 and 1935, another 6.5 ft (1.98 m) of sediment was deposited, for a total deposition of 13 to 16.5 ft (3.96 - 5.03 m) during the century after the Red River was cleared. The results of this survey suggest that an additional 3 to 9 ft (0.91 - 2.74 m) of silt has settled onto the floor of the study area since 1935.

In sum, between 17 and 25.5 ft (5.18 - 7.77 m) of sediment has accumulated since 1839. Any vessels wrecked more than 157 years ago are likely to be buried beneath that amount of sediment. Vessels wrecked more than a century ago lie beneath 10 ft (3.05 m) or more of bottom sediment, and vessels 50 years of age are covered with 2 to 9 ft (0.61 - 2.74 m) of silt.

Given that bottom depths in the project area now average less than 12 ft (3.67 m), the amount of progradation experienced in the last century and a half exceeds anything that will result from future dredging operations. Therefore, it appears that the first category of potential adverse impacts resulting from the proposed undertaking, that of distortion or breakage of remains from the added weight of disposed dredge spoil, is unlikely to be significant. Sediment loading and consequent distortion of any extant historic shipwrecks already has occurred. The planned disposal of dredged material is unlikely to add appreciably to any adverse impacts already induced through natural processes.

There is no evidence to suggest that the second category of potentially adverse impacts, a hastening of decay due to localized burial, is a cause for serious concern. The greatest degradation of a ship's structural remains usually comes from wave action on the structure and from infestation by marine borers (*Teredinidae* and *Limnoria*). Effects of burial upon ferrous and organic materials are more complex and sometimes difficult to predict. In any case, burial through sedimentation already has occurred in the Atchafalaya ODMS. It seems likely that, once buried, structural elements of any resources have been protected from the effects of wave action and geostrophic currents. Burial also protects wood from invasion by borers, and anaerobic conditions can slow or halt the degradation of organic materials. Therefore, the natural deposition of sediments in the study area probably has helped preserve archeological remains.

The impact from the disposal of dredged materials in the Atchafalaya ODMS is highly unlikely to add appreciably to the impacts already induced by the progradation that has occurred in the study area during the last century. As a result, **no further archeological investigations appear to be warranted for the proposed undertaking, the use of the area as a disposal area for dredged material.** If, in the future, activities are planned for the project area which entail removal of bottom sediments through dredging or other means, or the installation of pipe trenches, a reexamination of the area's archeological potential would be advisable, including subbottom investigation, identification, and evaluation of the potentially significant anomalies.

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Dr. R. Christopher Goodwin was the Principal Investigator for the project; Dr. John L. Seidel acted as Project Manager and directed and supervised all aspects of the project; Mr. David S. Robinson served as Assistant Project Manager and was responsible for fieldwork logistical planning and data analysis; Archeological Technician Mr. Christopher Sperling assisted Dr. Seidel in the field and helped Mr. Robinson and Remote Sensing Specialist Mr. Adam I. Kane with the post-processing and analysis of survey data. Mr. Jeremy Pincowski conducted archival background research for the project. Graphics for the report were produced by Mr. Augustine Fahey and Mr. Douglas Gann. The report was edited by Dr. Seidel, and was produced by Ms. Sharon Little and Ms. Sandi Castle.

APPENDIX I

PROJECT SCOPE OF SERVICES



DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

May 9, 1996

Contracting Division
Technical Services Branch

R. Christopher Goodwin & Associates
5824 Plauche Street
New Orleans, LA 70123

Gentlemen:

Enclosed is Delivery Order No. 0009 to Contract No.
DACW29-94-D-0019.

Sincerely,

A handwritten signature in cursive script, reading "Martha P. Sloan".

MARTHA P. SLOAN
Chief, Technical Service Branch

Enclosure

1 March 1996

Scope of Services
Remote Sensing Survey of Atchafalaya River Ocean Dredged
Material Disposal Site, Louisiana

1. **Introduction.** This delivery order requires the performance of a remote sensing survey designed to locate submerged cultural resources which may be impacted by disposal of dredged material in the Atchafalaya River Ocean Dredged Material Disposal Sites (ODMDS). The project area is located along coastal Louisiana along the east side of Atchafalaya River Bar Channel (Figure 1).

Adverse impacts to cultural resources can result from the disposal of dredged material to any significant cultural resources at the site. Adverse impacts include: 1) increase weight of sediments on any significant shipwreck, and 2) localized burial of possible shipwrecks changing their environment and possibly increasing the rate of decay. While the temporary mounding of dredged material may occur within the disposal sites, the mounds do disperse fairly quickly. The disposed sediments are reworked by waves and littoral currents and are moved out of the ODMDS. The direction and speed of currents are variable, but sediments generally drift toward the west under most circumstances.

2. **Background Information.** The coastal area of Louisiana has been an important navigation route since prehistoric times. Prehistoric vessels were used in Gulf waters to exploit marine resources. Evidence of this has been uncovered at several archeological sites in the state. In the colonial period, waterborne commerce was associated with French and Spanish trade and transportation routes. Later during the American Period water transportation was related to plantations established along various bayous emptying into the Gulf of Mexico. At present, there are 42 recorded shipwrecks in the coastal waters of Louisiana and numerous wrecks in the rivers and bayous.

The number of recorded shipwrecks represent only a small fraction of the wrecks which are expected to exist in the project vicinity. The project area, as a portion of the Louisiana coastal waters, had the potential to contain colonial era (ca. 1718-1803) shipwrecks. The 1979 discovery of the El Nuevo Constante, a Spanish sailing vessel lost in 1766 in similar waters off the coast of Cameron Parish, amply illustrates this potential. The probability for shipwrecks in the project vicinity increase for nineteenth and twentieth century vessels due to the increased maritime commerce in the region.

A brief navigational history of the coastal water of the Gulf of Mexico and an inventory of known shipwrecks in the study area is provided in the report entitled A History of Waterborne Commerce And Transportation Within the U.S. Army Corps of Engineers, New Orleans District and an Inventory of Known Underwater Cultural Resources prepared by Coastal Environments, Inc. This study documents over 59 shipwrecks in the Atchafalaya River channel and 7 in the Bay.

3. **Study Area.** The study area consists of the Atchafalaya River Bar Channel ODMDS. This previously used ODMDS site is located on the east side of the channel and is approximately 19.13 miles long by 0.5 miles wide (Figure 2). The average depth in this area is approximately 16 feet.

4. **General Nature of the Work.** The purpose of this study is to locate any historic shipwrecks in the above noted project areas. The study will employ a systematic magnetometer and side scan sonar survey of the study areas using precise navigation control and a fathometer to record bathymetric data. All potentially significant anomalies will be briefly investigated via additional intensive survey and probing of the water bottom (if possible). No diving will be performed under this delivery order.

The project requires historic background research, followed by the intensive survey of the proposed ODMDS area. An inventory of all magnetic, sonar, and bathymetric anomalies will be prepared. The background research, field survey, and data analyses will be documented in a brief management summary and comprehensive technical report.

5. **Study Requirements.** The study will be conducted utilizing current professional standards and guidelines, including, but not limited to:

the National Park Service's National Register Bulletin entitled "How to Apply the National Register Criteria for Evaluation";

the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation as published in the Federal Register on September 29, 1983;

Louisiana's Comprehensive Archeological Plan dated October 1, 1983;

the Advisory Council on Historic Preservation's regulation 36 CFR Part 800 entitled, "Protection of Historic Properties" and

the Louisiana Submerged Cultural Resources Management Plan published by the Louisiana Division of Archaeology in 1990.

The study will be conducted in three phases: review of background sources, remote sensing survey, and data analyses and report preparation.

Phase 1. Review of Background Sources. Due to the availability of the study referenced in Section 2. above, this phase is limited to a brief review of pertinent information contained in the referenced CEI report, Chief of Engineers reports, and general histories of the parishes covering the project.

In addition to reviewing the cultural background of the project area, geological and sedimentological studies will be examined to develop a concise summary of the physical environment of the project areas. This investigation specifically will examine issues relating to wreck dispersion and preservation as well as channel changes.

Phase 2a . Remote Sensing Survey. Upon completion of Phase 1, the contractor shall proceed with execution of the fieldwork. The equipment array required for this survey effort is:

- (1) a marine magnetometer;
- (2) a differential gps positioning system;
- (3) a recording fathometer;
- (4) a side scan sonar system.

The following requirements apply to the survey:

- (1) transect lane spacing will be no more than 160 feet;
- (2) positioning control points will be obtained at least every 100 feet along transects;
- (3) background noise will not exceed +/- 3 gammas;
- (4) magnetic data will be recorded on 100 gamma scale;
- (5) the magnetometer sensor will be towed a minimum of 2.5 times the length of the boat or projected in front of the survey vessel to avoid noise from the survey vessel;
- (6) the survey will utilize the Louisiana Coordinate System.

Phase 2b. Definition of Anomalies. Additional, more tightly spaced transects will be conducted over all potentially significant anomalies to provide more detail on site configuration and complexity. Probing of the water bottom will be performed at all potentially significant anomalies where water depths and weather conditions permit.

Phase 3: Data Analyses and Report Preparation. All data will be analyzed using currently acceptable scientific methodology. The post-survey data analyses and report presentation will include as a minimum:

- (1) post-plots of survey transects, data points

- and bathymetry;
- (2) same as above with magnetic data included;
 - (3) plan views of all potentially significant anomalies showing transects, data points, magnetic and depth contours;
 - (4) correlation of magnetic, sonar and fathometer data, where appropriate; and
 - (5) high quality reproduction of sonar records related to potentially significant anomalies.

The interpretation of identified magnetic anomalies will rely on expectations of the character (i.e. signature) of shipwreck magnetics derived from the available literature. Interpretation of anomalies will also consider probable post-depositional impacts, and the potential for natural and modern, i.e. insignificant sources of anomalies.

The report shall contain an inventory of all magnetic, sonar, and bathymetric anomalies recorded during the underwater survey, with recommendations for further identification and evaluation procedures when appropriate. These discussions must include justifications for the selection of specific targets for further evaluation. Equipment and methodology to be employed in evaluation studies must be discussed in detail.

A product to be provided under this delivery order and submitted with the draft reports will include CAD graphics and/or design files compatible with the NOD Intergraph system. The maps and supporting files generated from marine survey data will show, at a minimum, the survey coverage area, the locations of all anomalies and other pertinent features such as: channel beacons and buoys, channel alignments, bridges, cables and pipeline crossings. The maps will be accompanied by tables listing all magnetic anomalies recorded during the survey. At a minimum, the tables will include the following information: Project Name; Survey Segment/Area; Magnetic Target Number; Gammas Intensity; Target Coordinates (Louisiana State Plane).

If determined necessary by the COR, the final report will not include detailed site location descriptions, state plane or UTM ~~coordinates~~. The decision on whether to remove such data from the final report will be based upon the results of the survey. If removed from the final report, such data will be provided in a separate appendix. The analyses will be fully documented. Methodologies and assumptions employed will be explained and justified. Inferential statements and conclusions will be supported by statistics where possible. Additional requirements for the draft report are contained in Section 6 of this Scope of Services.

6. Reports.

Management Summary. Three copies of a brief management summary which presents the results of the field work will be submitted to the COTR within 1 week of completion of the survey area. The report will include a brief summary of the historical research and field survey methods by waterway, as well as descriptions of each anomaly located during the survey. Recommendations for further identification and evaluation procedures will be provided if appropriate. A preliminary map will be included showing the locations of each anomaly. A summary table listing all anomalies will be included with the maps. The table will include the following information: Project Name; Survey Segment/Area; Magnetic target number; Gammas Intensity; Target Coordinates (Louisiana State Plane).

Draft and Final Reports (Phase 1-3). Six copies of the draft report integrating all phases of this investigation will be submitted to the COR for review and comment within 16 weeks after work item award. The digitized project maps will also be submitted with the draft report.

The written report shall follow the format set forth in MIL-STD-847A with the following exceptions: (1) separate, soft, durable, wrap-around covers will be used instead of self covers; (2) page size shall be 8-1/2 x 11 inches with 1-inch margins; (3) the reference format of American Antiquity will be used. Spelling shall be in accordance with the U.S. Government Printing Office Style Manual dated January 1973.

The COR will provide all review comments to the Contractor within 4 weeks after receipt of the draft reports (20 weeks after work item award). Upon receipt of the review comments on the draft report, the Contractor shall incorporate or resolve all comments and submit one preliminary copy of the final report to the COR within 3 weeks (23 weeks after work item award). Upon approval of the preliminary final report by the COR, the Contractor will submit one reproducible master copy, one copy on floppy diskette, and 40 copies of the final report to the COR within 26 weeks after work item award.

7. Weather Contingencies. The potential for weather-related delays during the survey necessitates provision of weather contingency days in the delivery order. Two weather contingency days have been added to the fieldwork. The Contractor assumes the risk for any additional costs associated with weather delays in excess of four days. If the Contractor experiences unusual weather conditions, he will be allowed additional time on the delivery schedule but no cost adjustment.

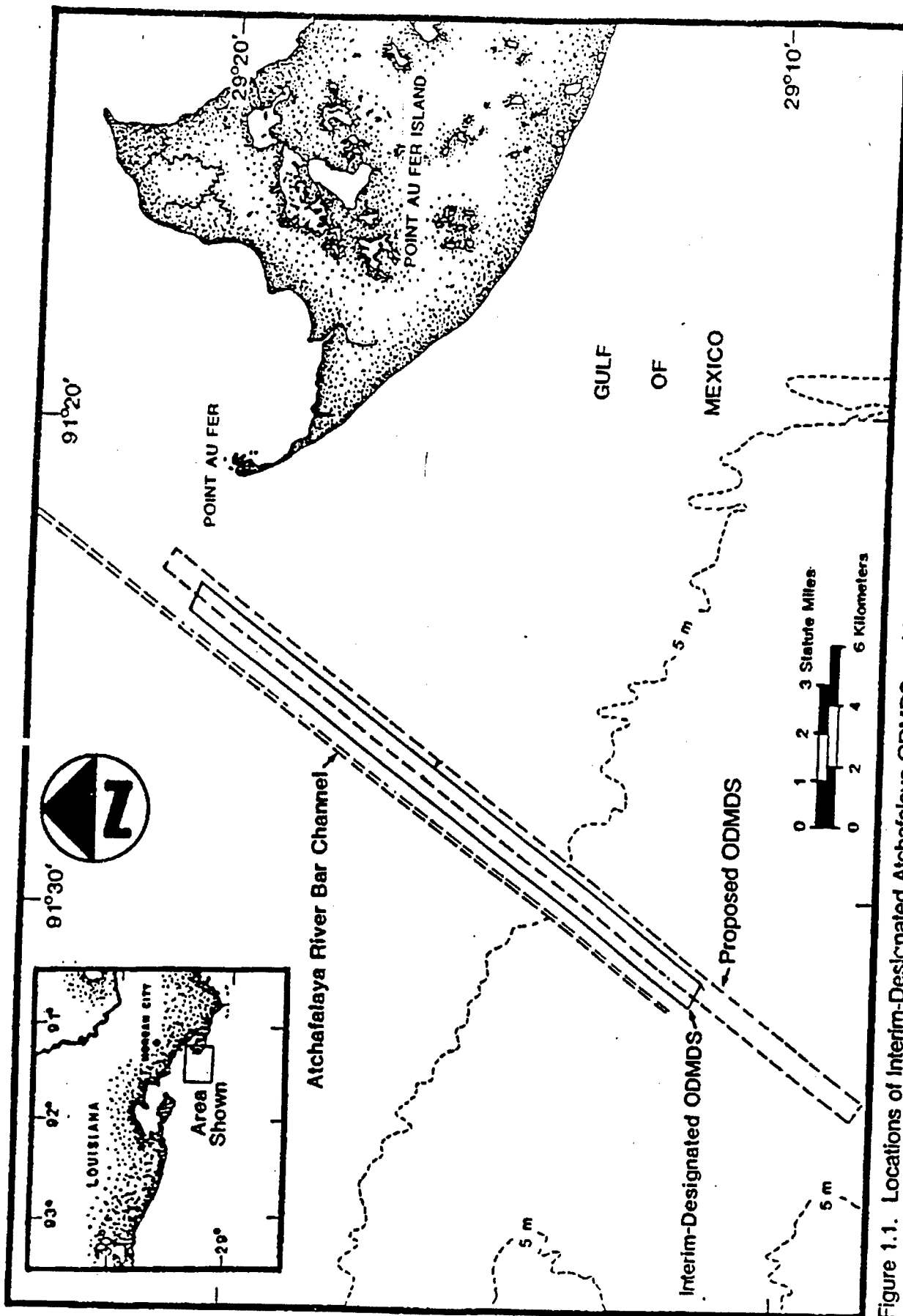


Figure 1.1. Locations of Interim-Designated Atchafalaya ODMDS and Proposed Atchafalaya ODMDS.

APPENDIX II

INVENTORIES OF ACOUSTIC ANOMALIES DISCOVERED IN INITIAL SURVEY

**INVENTORY OF ACOUSTIC ANOMALIES AT ATCHAFALAYA ODMDS
SURVEY BLOCK - 1**

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE (NAD-27)	LONGITUDE (NAD-27)	CORRELATIONS
A1	1/1	7/4/96 16:23:05	linear anomaly with centered depression	0 ft (on centerline)	29.10.472N	91.32.879W	
A2	1/1	7/4/96 16:37:15	L-shaped anomaly	102-197 ft starboard	29.09.469N	91.33.757W	
A3	1/1	7/4/96 16:37:47	L-shaped anomaly	82.5-167.9 ft port	29.09.433N	91.33.790W	
A4	1/2	7/5/96 11:19:56	40 ft wide area of disturbance on bottom surface	32.4 ft port	29.10.762N	91.32.577W	
A5	1/2	7/5/96 11:27:17	cluster of (3) adjacent oblong anomalies	117.9-201.4 ft starboard	29.10.258N	91.33.027W	
A6	1/3	7/5/96 13:54:19	170 ft long plateau	39.5 ft port	29.10.706N	91.32.600W	M4
A7	1/3	7/5/96 14:01:12	area of disturbance on bottom surface near centerline	57.9 ft port- 39.6 ft starboard	29.10.216N	91.33.027W	
A8	1/3	7/5/96 14:11:07	15 ft long crescentic anomaly	172.3 ft port	29.09.505N	91.33.651W	
A9	1/3	7/5/96 14:11:16	faint irregularly-shaped anomaly with pronounced acoustic shadow	47.5 ft starboard	29.09.493N	91.33.660W	
A10	1/3	7/5/96 14:11:27	faint irregularly-shaped anomaly with pronounced acoustic shadow	66.8 ft starboard	29.09.482N	91.33.671W	

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE (NAD-27)	LONGITUDE (NAD-27)	CORRELATIONS
A11	1/4	7/5/96 13:10:26- 13:16:10	irregular meandering acoustic shadow (possible geological origin)	57.2-105.5 ft starboard	29.08.298N- 29.08.129N	91.34.676W- 91.34.665W	
A12	1/5	7/5/96 15:11:04- 15:12:39	area of disturbance on bottom surface (possible modern refuse)	59.8- 121.3 ft port	29.10.733N- 29.10.612N	91.32.491W- 91.32.595W	M8
A13	1/6	7/5/96 11:15:00	large linear anomaly oriented perpendicular to centerline	visible across entire transect	29.10.599N	91.32.572W	M10
A14	1/7	7/5/96 12:18:55	U-shaped anomaly	97.6 ft starboard	29.09.684N	91.33.345W	
A15	1/7	7/5/96 12:31:16- 12:31:34	cluster of small, discrete, pronounced anomalies	68.6 ft starboard	29.10.641N- 29.10.667N	91.32.496W- 91.32.472W	M11
A16	1/8	7/5/96 13:25:30	pronounced oblong anomaly	162.6 port	29.08.821N	91.34.070W	
A17	1/9	7/5/96 14:47:48- 14:48:30	linear anomaly oriented diagonally across centerline (possible gas pipeline section)	197.8 ft port- 101.9 ft starboard	29.09.482N- 29.09.242N	91.33.697W- 91.33.651W	M13
A18	1/9	7/5/96 14:58:10	unidentifiable object in the water column with pronounced acoustic shadow	in water column on port side	29.09.968N	91.33.002W	
A19	1/9	7/5/96 14:58:29	30 ft wide area of disturbance on bottom surface	94.9 ft port	29.09.990N	91.32.983W	
A20	1/10	7/5/96 10:00:41	trapezoid-shaped anomaly	144.2 ft starboard	29.10.618N	91.32.365W	
A21	1/10	7/5/96 10:08:53- 10:10:24	area of disturbance on bottom surface	180.0 ft port- 180.0 ft starboard	29.10.070N 29.09.967N	91.32.887W- 91.32.982W	

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE (NAD-27)	LONGITUDE (NAD-27)	CORRELATIONS
A22	1/11	7/5/96 08:47:54	pronounced linear anomaly (possible gas pipeline section)	70.3 ft port	29.09.616N	91.33.255W	M24
A23	1/12	7/5/96 09:32:09- 09:32:37	pronounced linear anomaly (possible gas pipeline section) oriented diagonally across centerline	120.4 ft port - 46.6 ft starboard	29.09.900N- 29.09.129N	91.33.680W- 91.33.653W	
A24	1/12	7/5/96 09:41:44	pronounced linear anomaly (possible gas pipeline section) oriented diagonally across centerline	108.1 ft port- 112.6 ft starboard	29.09.828N- 29.09.863N	91.33.027W- 91.32.993W	M32
A25	1/12	7/5/96 09:44:03	pronounced lens-shaped anomaly	101.9 ft port	29.10.011N	91.32.862W	
A26	1/12	7/5/96 09:45:32	series of concentric U-shaped anomalies	63.3 ft port- 109.8 ft starboard	29.10.130N- 29.10.232N	91.32.759W- 91.32.664W	M33
A27	1/12	7/5/96 09:48:16	pronounced oblong anomaly with a distinct acoustic shadow	70.4 ft starboard	29.10.343N	91.32.565W	M35
A28	1/13	7/5/96 07:18:48- 07:20:25	cluster of linear anomalies (possible gas pipeline sections) in vicinity of gas platform clearly visible on sonar record	148.5 ft port- 175.0 ft starboard	29.10.419N- 29.10.303N	91.32.467W- 91.32.564W	M39
A29	1/14	7/5/96 08:26:19	gas platform	54.04 ft port	29.10.326N	91.32.501W	M46
A30	1/15	7/4/96 17:46:06	gas platform	58.0 ft port	29.10.345N	91.32.514W	M50
A31	1/15	7/4/96 17:50:25- 17:51:18	linear anomaly oriented across centerline	134.5 ft port- 112.6 ft starboard	29.09.992N	91.32.743	M50
A32	1/15	7/4/96 17:54:32- 17:55:13	linear anomaly oriented across centerline	150.3 ft port- 147.8 ft starboard	29.09.715N	91.33.012W	

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE (NAD-27)	LONGITUDE (NAD-27)	CORRELATIONS
A33	1/15	7/4/96 18:02:19	pronounced lens-shaped anomaly	176.7 ft port	29.09.179N	91.33.484W	
A34	1/15	7/4/96 18:02:30	pronounced lens-shaped anomaly	202.2 ft port	29.09.166N	91.33.498W	
A35	1/15	7/4/96 18:09:33- 18:10:12	linear anomaly oriented across centerline	88.7 ft port- 81.8 ft starboard	29.08.634N	91.33.962W	M48
A36	1/16	7/5/96 07:00:23- 07:01:44	linear anomaly oriented across centerline	159.1 ft port- 191.7 ft starboard	29.09.650N	91.33.024W	
A37	1/16	7/5/96 07:04:32	rectangular anomaly and lens-shaped anomaly surrounded by area of disturbance on bottom surface	190.0 ft starboard	29.09.907N	91.32.798W	M55
A38	1/16	7/5/96 07:04:32- 07:05:38	linear anomaly oriented diagonally across centerline	120.4 ft port- 190.0 ft starboard	29.09.965N	91.32.748W	M55
A39	1/16	7/5/96 07:05:38	diamond-shaped anomaly	120.4 ft port	29.09.992N	91.32.722W	M55
A40	1/16	7/5/96 07:05:18- 07:05:54	cluster of discrete anomalies including diamond-shaped, ring-shaped, and lens shaped objects surrounded by an area of disturbance on bottom surface	164.5 ft port	29.09.968N- 29.10.013N	91.32.746W- 91.32.704W	M55
A41	1/16	7/5/96 07:07:22- 07:07:55	cluster of anomalies including a C-shaped anomaly and (3-5) smaller irregularly shaped anomalies	102.0-185.6 ft starboard	29.10.132N- 29.10.168N	91.32.598W- 91.32.564W	M55

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE (NAD-27)	LONGITUDE (NAD-27)	CORRELATIONS
A42	1/16	7/5/96 07:06:35- 07:08:53	scattered cluster of pronounced linear anomalies (possible gas pipeline sections)	142.4-151.6 ft port	29.10.068N- 29.10.247N	91.32.656W- 91.32.456W	M55
A43	1/17	7/4/96 17:23:06- 17:24:37	linear anomaly oriented diagonally across centerline	135.3 ft port-177.7 ft starboard	29.09.593N	91.33.043W	
A44	1/17	7/4/96 17:27:53- 17:29:08	linear scour-like depression in bottom surface	143.4-148.5 ft port	29.09.902N	91.32.768W	M57
A45	1/17	7/4/96 17:37:06	crescentic plateau surrounded by scour-like depression in bottom surface	111.7 ft starboard	29.10.499N	91.32.237W	M60

**INVENTORY OF ACOUSTIC ANOMALIES AT ATCHAFALAYA ODMDS
SURVEY BLOCK - 2**

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE (NAD-27)	LONGITUDE (NAD-27)	CORRELATIONS
A46	2/2	7/5/96 16:29:07	pronounced linear anomaly oriented horizontally across centerline	51.8 ft port- 55.4 ft starboard	29.11.050N	91.32.323W	M63
A47	2/2	7/5/96 16:29:37	pronounced linear anomaly oriented horizontally across centerline	33.3 ft port- 52.8 ft starboard	29.11.083N	91.32.292W	M63
A48	2/2	7/5/96 16:30:27	pronounced linear anomaly oriented horizontally across centerline	85.2 ft port- 56.3 ft starboard	29.11.141N	91.32.239W	M64
A49	2/2	7/5/96 16:59:32- 17:01:03	cluster of pronounced oblong anomalies	189.9 ft port- 56.3 ft starboard	29.31.317N- 29.31.242N	91.30.474W- 91.30.384W	M77
A50	2/5	7/5/96 17:11:04	(2) irregularly-shaped anomalies straddling the centerline	21.9 ft port- 56.3 ft starboard	29.12.977N	91.30.505W	M103
A51	2/5	7/5/96 17:11:45	pronounced 15 ft long oblong anomaly oriented perpendicular to centerline	186.5 ft starboard	29.12.925N	91.30.549	
A52	2/5	7/5/96 17:19:55	faint 20 ft diameter crescentic anomaly	58.9 ft starboard	29.12.292N	91.31.107W	
A53	2/6	7/6/96 12:48:12- 12:49:44	narrow linear anomaly crossing centerline (possible gas pipeline)	anomaly extends across entire transect port-starboard	29.11.579N- 29.11.680N	91.31.702W- 91.31.615W	M110
A54	2/6	7/6/96 12:55:24	pronounced 40 ft wide rectangular anomaly	190.8 ft port	29.12.065N	91.31.269W	

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE (NAD-27)	LONGITUDE (NAD-27)	CORRELATIONS
A55	2/7	7/6/96 14:04:52	40 ft wide lens-shaped anomaly	49.2 ft port	29.11.573N	91.31.670W	M120
A56	2/7	7/6/96 14:05:25	(2) adjacent anomalies consisting of a square-shaped object and a rectangular object	75.5 ft port	29.11.608N	91.31.638W	M120
A57	2/7	7/6/96 14:06:37	80 ft long lens-shaped anomaly	67.7 ft port	29.11.688N	91.31.563W	M120
A58	2/7	7/6/96 14:08:55	triangular anomaly	143.3 ft port	29.11.846N	91.31.428W	
A59	2/7	7/6/96 14:12:53	25 ft diameter circular anomaly	134.5 ft port	29.12.114N	91.31.194W	
A60	2/8	7/6/96 15:23:27	gas platform	181.2 ft starboard	29.11.589N	91.31.606W	M132
A61	2/8	7/6/96 15:23:30	35 ft wide rectangular anomaly	123.0 ft port	29.11.609N	91.31.597W	M132
A62	2/9	7/6/96 12:20:10	gas platform	89.6 ft port	29.11.595N	91.31.589W	M142
A63	2/10	7/6/96 10:39:47	area of disturbance on bottom surface	59.7-136.2 ft port	29.13.177N- 29.13.153N	91.30.120W- 91.30.142W	M158
A64	2/10	7/6/96 10:42:01	30 ft wide irregularly-shaped anomaly	87.1 ft starboard	29.13.027N	91.30.282W	
A65	2/10	7/6/96 10:42:29	30 ft wide irregularly-shaped anomaly	128.4 ft starboard	29.12.989N	91.30.311W	M157
A66	2/10	7/6/96 10:42:32	pronounced 35 ft wide oblong anomaly	150.3 ft port	29.12.987N	91.30.313W	M157
A67	2/10	7/6/96 10:43:39	30 ft wide rectangular anomaly	116.9 ft port	29.12.892N	91.30.378W	

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE (NAD-27)	LONGITUDE (NAD-27)	CORRELATIONS
A68	2/10	7/6/96 10:44:20	110 ft wide area of disturbance on bottom surface	96.6 ft port	29.12.837N	91.30.417W	
A69	2/10	7/6/96 10:44:29	pronounced small circular anomaly	210 ft port	29.12.824N	91.30.428W	M155
A70	2/10	7/6/96 10:44:56	area of disturbance on bottom surface	210 ft starboard	29.12.790N	91.30.457W	M155
A71	2/10	7/6/96 10:44:59	area of disturbance on bottom surface	152.9 ft port	29.12.785N	91.30.401W	M155
A72	2/10	7/6/96 10:46:01	area of disturbance on bottom surface	172.3 ft port	29.12.712N	91.30.536W	
A73	2/10	7/6/96 10:46:08	U-shaped anomaly	13.1 ft port	29.12.705N	91.30.543W	
A74	2/10	7/6/96 10:46:31	50 ft wide area of disturbance on bottom surface	126.6 ft port	29.12.678N	91.30.574W	
A75	2/10	7/6/96 10:46:38	50 ft wide area of disturbance on bottom surface	77.3 ft port	29.12.669N	91.30.584W	
A76	2/10	7/6/96 10:47:51	large crescentic anomaly	8.1-150.0 ft port	29.12.582N	91.30.670W	M154
A77	2/10	7/6/96 10:48:29	80 ft wide irregularly-shaped anomaly	140.6 ft port	29.12.530N	91.30.709W	M154
A78	2/10	7/6/96 10:48:33	40 ft wide rectangular anomaly	52.7 ft port	29.12.524N	91.30.713W	M154
A79	2/10	7/6/96 10:48:44	70 ft wide irregularly-shaped anomaly	87.7 ft port	29.12.512N	91.30.724W	M154
A80	2/10	7/6/96 10:49:26	70 ft wide irregularly-shaped anomaly	130.1 ft port	29.12.450N	91.30.767W	M154
A81	2/10	7/6/96 10:50:40	pronounced anomaly	131.8 ft port	29.12.363N	91.30.852W	M153

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE (NAD-27)	LONGITUDE (NAD-27)	CORRELATIONS
A82	2/10	7/6/96 10:51:00	30 ft wide irregularly-shaped anomaly	80.8 ft port	29.12.334N	91.30.875W	M153
A83	2/10	7/6/96 10:54:96	pronounced oblong anomaly	175.8 ft port	29.12.084N	91.30.104W	
A84	2/10	7/6/96 11:01:19	gas platform	57.1 ft port	29.11.593N	91.31.581W	M152
A85	2/11	7/5/96 18:01:43	50 ft long linear cluster of small anomalies oriented perpendicular to the centerline	70.4-124.95 ft starboard	29.12.236N	91.30.929W	
A86	2/11	7/5/96 18:10:05	60 ft long linear cluster of anomalies oriented perpendicular to centerline	77.4-131.1 ft starboard	29.12.332N	91.30.842W	
A87	2/11	7/5/96 18:15:19	pronounced 30 ft long oblong anomaly	72.0 ft port	29.12.705N	91.30.525	
A88	2/11	7/5/96 18:16:30	40 ft long pronounced oblong return	197.9 ft port	29.12.785N	91.30.438W	
A89	2/11	7/5/96 18:21:43	crescentic anomaly	64.2-173.3 ft starboard	29.13.152N	91.30.120W	M167
A90	2/11	7/5/96 18:22:00	area of disturbance on bottom surface	12.2-148.5 ft port	29.13.172N	91.30.100W	
A91	2/11	7/5/96 18:22:09	area of disturbance on bottom surface	112.6-168.9 ft port	29.13.181N	91.30.091W	
A92	2/12	7/6/96 09:30:44	(3) oval anomalies	69.4 ft port	29.12.586N	91.30.588W	
A93	2/12	7/6/96 09:32:28	40 ft wide rectangular anomaly	136.2 ft port	29.12.453N	91.30.687W	M171
A94	2/12	7/6/96 09:33:52	50 ft wide area of disturbance on bottom surface	79.1 ft port	29.12.361N	91.30.771W	

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE (NAD-27)	LONGITUDE (NAD-27)	CORRELATIONS
A95	2/12	7/6/96 09:34:10	40 ft wide area of disturbance on bottom surface	91.4 ft port	29.12.334N	91.30.798W	
A96	2/12	7/6/96 09:34:17	60 ft wide area of disturbance on bottom surface	157.4 ft starboard	29.21.325N	91.30.807W	
A97	2/12	7/6/96 09:34:54	oval anomaly	109.0 ft port	29.12.283N	91.30.846W	M170
A98	2/12	7/6/96 09:35:50	10 ft diameter circular anomaly	202.2 ft port	29.12.216N	91.30.908W	M170
A99	2/12	7/6/96 09:36:04	20 ft diameter circular anomaly	202.2 ft port	29.12.199N	91.30.923W	M170
A100	2/12	7/6/96 09:36:10	pronounced 45 ft long oblong anomaly	18.4 ft port	29.12.192N	91.30.929W	M170
A101	2/12	7/6/96 09:36:33	faint 80 ft long oblong anomaly	91.5 ft starboard	29.12.164N	91.30.955W	
A102	2/13	7/6/96 08:06:49	pronounced 20 ft wide square anomaly	184.6 ft starboard	29.45.949N	91.30.218W	
A103	2/13	7/6/96 08:06:49	pronounced small circular anomaly	58.8 ft port	29.45.949N	91.30.218W	
A104	2/13	7/6/96 08:09:45	rectangular anomaly	60.6 ft port	29.12.756N	91.30.396W	
A105	2/13	7/6/96 08:09:55	lens-shaped anomaly	63.2 ft port	29.12.745N	91.30.405W	
A106	2/13	7/6/96 08:13:35	pronounced 25 ft long oblong anomaly	87.9 ft port	29.12.473N	91.30.635W	
A107	2/13	7/6/96 08:14:34	area of disturbance on bottom surface	50.9 ft port	29.12.430N	91.30.670W	
A108	2/13	7/6/96 08:27:04	L-shaped anomaly	14.0-202.2 ft port	29.11.594N	91.31.409W	M176

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE (NAD-27)	LONGITUDE (NAD-27)	CORRELATIONS
A109	2/14	7/6/96 11:38:51- 11:53:32	area of disturbance on bottom surface with multiple pronounced discrete anomalies	area extends across entire transect port-starboard	29.12.117N- 29.13.136N	91.30.922W- 91.30.014W	M186, M187, M188
A110	2/14	7/6/96 11:45:03	110 ft wide lens-shaped anomaly	75.5 ft port	29.12.538N	91.30.544W	M187
A111	2/14	7/6/96 11:44:31	pronounced 30 ft wide rectangular anomaly	196.9 ft port	29.12.502N	91.30.577W	
A112	2/15	7/6/96 10:22:06	pronounced 30 ft long oblong anomaly	163.5 ft port	29.12.142N	91.30.857W	
A113	2/15	7/6/96 10:26:48	pronounced oblong anomaly	137.1 ft port	29.12.481N	91.30.569W	B8, M191
A114	2/15	7/6/96 10:27:52	irregularly-shaped anomaly surrounded by area of disturbance on bottom surface	159.1 ft port	29.12.556N	91.30.501W	
A115	2/15	7/6/96 10:28:05	oval anomaly	106.4 ft starboard	29.12.572N	91.30.487W	M192
A116	2/15	7/6/96 10:28:24	120 ft wide area of disturbance on bottom surface	125.7 ft port	29.12.593N	91.30.467W	M192
A117	2/15	7/6/96 10:28:51	pronounced 30 ft long crescentic anomaly	103.7 ft port	29.45.625N	91.30.437W	
A118	2/15	7/6/96 10:30:19	oval anomaly	88.0 ft starboard	29.12.728N	91.30.344W	
A119	2/15	7/6/96 10:30:27	pronounced 25 ft long oblong anomaly	83.5 ft port	29.12.738N	91.30.336W	
A120	2/15	7/6/96 10:31:02	pronounced 20 ft long oblong anomaly	28.9 ft port	29.12.788N	91.30.300W	M193
A121	2/15	7/6/96 10:31:02	pronounced 20 ft long oblong anomaly	139.8 ft starboard	29.12.788N	91.30.300W	M193

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE (NAD-27)	LONGITUDE (NAD-27)	CORRELATIONS
A122	2/15	7/6/96 10:33:28	pronounced U-shaped anomaly	27.2 ft port	29.12.881N	91.30.204W	B9
A123	2/15	7/6/96 10:33:28	area of disturbance on bottom surface	94.0- 168.8 ft port	29.12.881N- 29.12.931N	91.30.204W- 91.30.107W	B9
A124	2/15	7/6/96 10:33:46	50 ft wide area of disturbance on bottom surface	161.7 ft port	29.12.968N	91.30.129W	B9
A125	2/15	7/6/96 10:34:24	faint 75 ft wide anomaly	102.9 ft starboard	29.13.011N	91.30.088W	
A126	2/15	7/6/96 10:34:32	pronounced 45 ft wide irregularly shaped anomaly	158.2 ft port	29.13.020N	91.30.078W	
A127	2/15	7/6/96 10:35:17	pronounced oblong anomaly	185.5 ft port	29.13.072N	91.30.028W	
A128	2/15	7/6/96 10:35:22	100 ft wide area of disturbance on bottom surface	76.4 ft port	29.13.076N	91.30.024W	
A129	2/15	7/6/96 10:35:53	120 ft wide area of disturbance on bottom surface	79.9 ft port	29.13.116N	91.29.992W	
A130	2/16	7/6/96 09:06:44	45 ft wide oblong anomaly	80.9 ft starboard	29.12.167N	91.30.409W	
A131	2/16	7/6/96 09:08:08- 09:08:35	area of disturbance on bottom surface with multiple irregularly- shaped anomalies	80.9- 200.5 ft starboard	29.12.289N- 29.12.323N	91.30.690W- 91.30.659W	M199
A132	2/16	7/6/96 09:08:46	L-shaped anomaly	42.1 ft port	29.12.336N	91.30.647W	M199
A133	2/16	7/6/96 09:09:18	20 ft wide oval anomaly	88.0 ft port	29.12.375N	91.30.612W	
A134	2/16	7/6/96 09:14:40	50 ft wide area of disturbance on bottom surface	109.8 ft port	29.12.255N	91.30.255W	B10,B11, M201

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE (NAD-27)	LONGITUDE (NAD-27)	CORRELATIONS
A135	2/16	7/6/96 09:15:53	40 ft wide oval area of disturbance on bottom surface	117.8 ft port	29.12.867N	91.30.177W	B10, B11, M201
A136	2/16	7/6/96 09:16:43	35 ft wide rectangular anomaly	91.4 ft port	29.12.931N	91.30.125W	B10, B11, M201
A137	2/16	7/6/96 09:16:51	30 ft wide oval anomaly	116.9 ft port	29.12.941N	91.30.125W	B10, B11, M201
A138	2/17	7/6/96 07:40:39	pronounced 20 ft long oblong anomaly	131.0 ft port	29.11.606N	91.31.257W	
A139	2/17	7/6/96 07:43:26	20 ft diameter circular anomaly	53.6 ft port	29.11.826N	91.31.059W	
A140	2/17	7/6/96 07:44:05	25 ft diameter circular anomaly	118.6 ft port	29.11.880N	91.31.013W	
A141	2/17	7/6/96 07:54:38	large circular anomaly	165.4 ft starboard	29.12.718N	91.30.271W	

**INVENTORY OF ACOUSTIC ANOMALIES AT ATCHAFALAYA ODMDS
SURVEY BLOCK - 3**

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE (NAD-27)	LONGITUDE (NAD-27)	CORRELATIONS
A142	3/5	7/31/96 10:53:26- 10:54:10	area of disturbance on bottom surface (possible "propeller wash" from passing vessel)	135.4 ft starboard- limit of starboard channel	29.13.717N- 29.13.665N	91.29.884W- 91.29.892W	
A143	3/6	7/6/96 16:01:23	small diamond-shaped anomaly	55.3 ft port	29.13.736N	91.29.793N	
A144	3/7	7/6/96 17:15:32	20 ft wide oblong anomaly	90.5 ft port	29.13.480N	91.29.986W	
A145	3/7	7/6/96 17:21:51	small anomaly appearing on sonar record as dark circular spot	128.3 ft port	29.13.916N	91.29.584W	M408
A146	3/12	7/31/96 10:08:08- 10:09:27	linear anomaly oriented across centerline (possible gas pipeline)	across entire transect port-starboard	29.15.029N- 29.15.127N	91.28.405W- 91.28.328W	
A147	3/15	7/31/96 15:58:00- 15:58:25	linear anomaly (possible gas pipeline)	across entire transect port-starboard	29.15.431N- 29.15.394N	91.27.924W- 91.27.969W	M565
A148	3/17	7/31/96 15:47:43- 15:48:16	linear anomaly (possible gas pipeline)	across entire transect port-starboard	29.15.442N- 29.15.483N	91.27.869W- 91.27.831W	

**INVENTORY OF ACOUSTIC ANOMALIES AT ATCHAFALAYA ODMDS
SURVEY BLOCK - 4**

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE (NAD-27)	LONGITUDE (NAD-27)	CORRELATIONS
A149	4/1	7/4/96 13:57:01- 13:57:31	linear anomaly oriented across centerline	limit of port channel- 115.2 ft starboard	29.18.143N- 29.18.107N	91.26.106W- 91.26.135W	M612, M613
A150	4/3(N)	7/31/96 18:59:23-	linear anomaly oriented across centerline (possible gas pipeline)	157.3 ft port-107.3 ft starboard	29.17.730N	91.26.356W	M710, M711
A151	4/5(N)	8/1/96 08:05:37	linear anomaly oriented across centerline	125.7 ft port 139.0 ft starboard	29.17.636N	91.26.371W	
A152	4/8(N)	7/31/96 19:09:23- 19:09:49	faint linear anomaly oriented across centerline	165.3 ft port- 72.1 ft starboard	29.17.565N- 29.17.589N	91.26.320W- 91.26.297W	B64
A153	4/14	7/4/96 13:37:52- 13:38:14	linear anomaly oriented across centerline	limit of port channel- 61.6 ft starboard	29.17.675N- 29.17.701N	91.25.978W- 91.25.954W	
A154	4/15	7/4/96 11:27:25- 11:27:49	linear anomaly oriented across centerline	limit of port channel- 61.6 ft starboard	29.17.652N- 29.17.682N	91.25.937W- 91.25.946W	
A155	4/16	7/4/96 09:55:55- 09:56:12	faint linear anomaly oriented across centerline	130.1 ft port- 42.2 ft starboard	29.16.959N- 29.16.976N	91.26.557W- 91.26.543W	B81, B82, B83
A156	4/16	7/4/96 09:56:26	series of linear anomalies oriented across centerline	across entire transect port-starboard	29.16.991N	91.26.532W	B81, B82, B83
A157	4/16	7/4/96 09:56:26	pronounced anomaly adjacent to A155	10.5 ft port	29.16.991N	91.26.532W	B81, B82, B83
A158	4/16	7/4/96 10:01:52- 10:02:16	linear anomaly oriented across centerline	101.0 ft port- 76.5 ft starboard	29.17.339N- 29.17.364N	91.26.219W- 91.26.194W	

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE (NAD-27)	LONGITUDE (NAD-27)	CORRELATIONS
A159	4/16	7/4/96 10:04:17	linear anomaly oriented across centerline	limit of port channel- 70.4 ft starboard	29.17.501N	91.26.078W	
A160	4/16	7/4/96 10:06:03- 10:06:35	linear anomaly oriented across centerline	111.7 ft starboard-limit of starboard channel	29.17.260N- 29.17.654N	91.25.966W- 91.25.937W	
A161	4/17	7/4/96 09:27:27- 09:27:53	linear anomaly oriented across centerline	130.1 ft port- 115.2 ft starboard	29.17.320N- 29.17.287N	91.26.189W- 91.26.221W	

**INVENTORY OF ACOUSTIC ANOMALIES AT ATCHAFALAYA ODMDS
SURVEY BLOCK - 5**

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE (NAD-27)	LONGITUDE (NAD-27)	CORRELATIONS
A162	5/7	8/3/96 14:53:32	area of disturbance on bottom surface oriented on centerline	32.4 ft port- 44.0 ft starboard	29.19.781N	91.24.399W	M957
A163	5/7	8/3/96 15:00:24- 15:00:49	area of disturbance on bottom surface oriented on centerline	73.8 ft port- 21.1 ft starboard	29.19.366N- 29.19.339N	91.24.761W- 91.24.780W	
A164	5/7	8/3/96 15:03:00	area of disturbance on bottom surface oriented across centerline	48.3 ft port- 58.0 ft starboard	29.19.199N	91.24.889W	
A165	5/8	8/3/96 15:36:18	L- shaped cluster of anomalies	0-77.3 ft port	29.19.199N	91.24.878W	

APPENDIX III

INVENTORIES OF BATHYMETRIC ANOMALIES DISCOVERED IN INITIAL SURVEY

INVENTORY OF BATHYMETRIC ANOMALIES AT ATCHAFALAYA ODMDS

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	CORRELATIONS
B1	1/15	7/4/96 17:47:39. 4	15 ft tall peak	1933102.7	183162.0	29.170164 69	91.5428843	M50
B2	2/3	7/6/96 13:30:45. 3	5-6 ft tall peak	1939752.3	194796.3	29.202175 62	91.5221163	
B3	2/3	7/6/96 13:16:56. 7	5 ft tall peak	1944986.8	201541.1	29.220741 47	91.5057461	
B4	2/4	7/6/96 14:56:15. 6	12 ft tall plateau	1937508.1	191682.1	29.193597 92	91.5291354	M87
B5	2/4	7/6/96 14:42:27. 2	4-5 ft tall peak	1942738.3	198384.8	29.212059 52	91.5127738	
B6	2/7	7/6/96 14:28:17. 5	(3) 2-3 ft tall peaks	1945281.6	200834.5	29.218846 35	91.5048935	
B7	2/12	7/6/96 09:31:28. 7	6-8 ft tall peak	1943450.5	197191.1	29.208780 40	91.5105353	
B8	2/15	7/6/96 10:26:55. 7	4-5 ft tall peak	1943853.2	196973.2	29.208218 16	91.5093546	A113, M191

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	CORRELATIONS
B9	2/15	7/6/96 10:33:46. 6	4-5 ft tall peak surrounded by 1-2 ft deep depressions	1946161.9	199861.7	29.216175 00	91.5021292	A122, A123, A124
B10	2/16	7/6/96 09:17:36. 9	2-3 ft tall peak	1946503.4	200026.6	29.216627 73	91.5010611	A134, A135, A136, A137, M201
B11	2/16	7/6/96 09:17:40. 6	5 ft tall peak surrounded by 1 ft deep depressions	1946523.8	200059.5	29.216718 68	91.5009970	A134, A135, A136, A137, M201
B12	3/2	7/6/96 17:03:34. 7	2-3 ft tall plateau	1946973.1	204365.3	29.228521 71	91.4995283	M281
B13	3/2	7/6/96 17:02:18. 7	2-3 ft tall plateau	1947384.1	204832.9	29.229805 47	91.4982445	
B14	3/2	7/6/96 17:02:02. 7	3-4 ft tall peak surrounded by 1 ft deep depressions	1947489.5	204947.6	29.230122 44	91.4979138	
B15	3/2	7/6/96 17:01:42. 6	3-4 ft tall peak	1947633.2	205184.8	29.230777 41	91.4974631	M280
B16	3/2	7/6/96 16:56:20. 8	3-4 ft tall peak	1949460.6	207585.9	29.237386 50	91.4917452	M271, M272
B17	3/2	7/6/96 16:47:01. 1	2-3 ft tall peak	1952706.2	211723.4	29.284779 33	91.4815847	M254, M255
B18	3/2	7/6/96 16:35:45. 1	2-3 ft tall peak	1956629.2	216765.9	29.262659 73	91.4693023	

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	CORRELATIONS
B19	3/3	7/6/96 18:16:48. 8	3 ft tall peak	1948985.4	206646.8	29.234802 67	91.4932307	M323
B20	3/3	7/6/96 18:15:03. 4	3 ft tall peak	1949561.0	207404.7	29.236886 46	91.4914312	M318, M319, M320
B21	3/3	7/6/96 18:13:47. 4	3 ft tall peak	1950018.0	207923.3	29.238319 27	91.4899974	M315, M316
B22	3/3	7/6/96 18:13:44. 4	3 ft tall peak	1950034.4	207945.8	29.238378 52	91.4899477	M315, M316
B23	3/3	7/6/96 18:09:16. 9	5 ft tall peak	1951490.1	209835.0	29.243581 41	91.4853902	M307, M308
B24	3/3	7/6/96 18:05:47. 9	3-4 ft tall peak	1952619.0	211297.3	29.247607 19	91.4818563	
B25	3/3	7/6/96 18:05:34. 6	3-4 ft tall peak	1952689.9	211385.3	29.247848 83	91.4816345	
B26	3/3	7/6/96 18:00:32. 6	2-3 ft tall peak	1954340.0	213500.5	29.253671 97	91.4764687	M301
B27	3/3	7/6/96 17:58:53. 8	4 ft tall peak	1954844.9	214210.5	29.255625 3	91.4748887	M300
B28	3/3	7/6/96 17:57:48. 9	3 ft tall peak	1955214.9	214633.5	29.256792 97	91.4737285	

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	CORRELATIONS
B29	3/3	7/6/96 17:52:12. 1	3 ft tall peak	1956999.7	216911.3	29.263054 69	91.4681453	M289
B30	3/3	7/6/96 17:51:58. 8	5 ft tall peak	1957075.0	217002.7	29.263309 83	91.46790068	
B31	3/4	7/31/96 08:21:26. 3- 08:21:27. 4	10 ft deep depression	1947346.5	204252.8	29.228252 67	91.4984377	
B32	3/4	7/31/96 08:51:03. 9	9 ft deep depression	1957129.8	216782.5	29.262745 57	91.4678133	M358
B33	3/5	7/31/96 10:48:09. 9	9-10 ft deep depression	1949390.3	206661.9	29.234839 00	91.4919665	
B34	3/5	7/31/96 10:46:25. 8	11 ft deep depression	1949963.7	207359.5	29.236770 48	91.4901641	
B35	3/6	7/6/96 16:10:14. 8	2-3 ft tall peak	1950873.0	208240.9	29.239235 81	91.4873975	
B36	3/7	7/6/96 17:18:46. 6	4-5 ft tall peak	1947949.7	204253.8	29.228257 88	91.4965465	
B37	3/7	7/6/96 17:32:23. 7	3-4 ft tall peak	1952807.3	210472.1	29.245377 41	91.4813428	

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	CORRELATIONS
B38	3/7	7/6/96 17:36:27. 1	4 ft tall peak	1954284.4	212344.7	29.250529 82	91.4767202	M419
B39	3/7	7/6/96 17:36:40. 4	3 ft tall peak	1954365.7	212458.4	29.250844 11	91.4764650	
B40	3/7	7/6/96 17:42:12. 0	4 ft tall peak	1956398.6	215043.6	29.257961 52	91.4700994	
B41	3/7	7/6/96 17:42:18. 0	3 ft tall peak	1956438.9	215091.5	29.258093 89	91.4699728	
B42	3/7	7/6/96 17:42:24. 0	3-4 ft tall peak	1956480.0	215134.2	29.258210 89	91.4698446	
B43	3/10	7/31/96 12:35:13. 8	2-3 ft tall peak	1950161.6	206294.8	29.233878 58	91.4896214	M468
B44	3/12	7/31/96 09:57:00. 7- 09:57:03. 5	10 ft deep depression surrounded by 2-3 ft tall peaks	1951567.5	207547.9	29.237332 62	91.4852174	
B45	3/13	7/31/96 12:03:40. 4	5 ft tall peak	1951622.8	207418.6	29.236934 62	91.4849654	M537
B46	3/13	7/31/96 12:03:32. 3	10 ft deep depression	1951672.9	207475.6	29.237091 84	91.4848082	

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	CORRELATIONS
B47	3/13	7/31/96 12:03:29. 3	12 ft deep depression	1951688.4	207494.3	29.237145 71	91.4847584	
B48	4/5	8/1/96 08:04:42. 9	2-3 ft tall peak	1965968.7	227784.6	29.293025 89	91.4404408	
B49	4/5	8/1/96 08:16:08. 6- 08:16:34. 7	convoluted bottom surface with 2 ft tall/deep peaks and depressions	1969623.4	232570.1	29.306188 25	91.4286784	M739
B50	4/5	8/1/96 11:14:12. 3	10 ft deep flat- bottomed depression	1958844.7	218747.4	29.268116 15	91.4623615	
B51	4/6	8/1/96 11:23:19. 3	10 ft deep flat- bottomed depression	1958095.8	217630.1	29.265072 10	91.4647908	M752, M753
B52	4/6	8/1/96 11:24:08. 4	10 ft deep depression	1958346.8	217984.7	29.266055 23	91.4640010	
B53	4/6	8/1/96 11:26:16. 1	2-3 ft tall peak	1959141.2	218875.1	29.268508 68	91.4615109	
B54	4/6	8/1/96 11:31:32. 4	2-3 ft deep depression	1960947.9	221186.6	29.274866 80	91.4558555	M758
B55	4/6	8/1/96 11:31:56. 5	4-6 ft tall plateau	1961080.8	221361.9	29.275351 18	91.4554381	M758

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	CORRELATIONS
B56	4/7	8/1/96 07:36:45. 5	8-9 ft deep depression	1968202.6	230162.1	29.299567 81	91.4331270	M766
B57	4/7	8/1/96 10:42:03. 0	3 ft tall peak	1959765.2	219414.7	29.269992 51	91.4595575	M771
B58	4/7	8/1/96 10:44:48. 6	8-9 ft deep depression	1960710.5	220590.8	29.273228 14	91.4565979	
B59	4/7	8/1/96 10:44:57. 9	8-9 ft deep depression	1960760.4	220658.0	29.273412 16	91.4564419	
B60	4/7	8/1/96 10:45:02. 9	2-3 ft deep depression	1960786.9	220692.6	29.273507 91	91.4563588	
B61	4/7	8/1/96 10:46:09. 2	4-5 ft tall peak	1961150.6	221184.6	29.274862 24	91.4552196	
B62	4/7	8/1/96 10:48:15. 8- 10:48:53. 8	convoluted bottom surface with 1-2 ft deep depressions	1961994.2	222211.6	29.277691 67	91.4525750	
B63	4/8	7/31/96 19:07:41. 4	2-3 ft deep depression	1965978.2	227087.3	29.291112 11	91.4400924	
B64	4/8	7/31/96 19:08:03. 1- 19:09:27. 2	(4) 2-3 ft deep depressions	1966384.1	227636.4	29.292619 66	91.4388235	A152, M777

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	CORRELATIONS
B65	4/8	7/31/96 19:21:02. 1- 19:21:53. 7	convoluted bottom surface with 2 ft peaks/depressions	1969864.9	232069.0	29.304814 58	91.4279177	
B66	4/9	7/31/96 18:30:29. 7- 18:30:59. 6	(4) 2-3 ft deep depressions	1965546.6	226261.2	29.288841 02	91.4414423	
B67	4/9	7/31/96 18:33:57. 7- 18:34:22. 6	convoluted bottom surface with 1-2 ft peaks/depressions	1966550.9	227556.4	29.292399 74	91.4383003	
B68	4/9	7/31/96 18:44:41. 7	2-3 ft deep depression	1969528.9	231383.6	29.302931 40	91.4289686	
B69	4/10	7/31/96 17:26:56. 8- 17:27:32. 9	convoluted bottom surface with 2-3 ft deep depressions and 1 ft tall peaks	1961549.6	220874.4	29.274011 20	91.4539665	M805
B70	4/10	7/31/96 17:28:14. 7- 17:31:48. 7	convoluted bottom surface with 2-3 ft deep depressions and 1 ft tall peaks	1962371.3	221970. 3	29.277026 24	91.4513936	M806
B71	4/10	7/31/96 17:34:57. 7- 17:42:08. 9	convoluted bottom surface with 2-3 ft deep depressions and 1 ft tall peaks	1965117.4	225428.0	29.286542 97	91.4427904	M807, M808

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	CORRELATIONS
B72	4/10	7/31/96 17:42:59. 4- 17:43:29. 5	convoluted bottom surface with 2-3 ft deep depressions and 1 ft tall peaks, corresponding with temporary 2 ft rise in ambient depth	1966404.4	227158.0	29.291303 75	91.4387586	
B73	4/10	7/31/96 17:53:52. 3	2-3 ft tall peak	1969672.0	231340.6	29.302814 19	91.4285191	M809
B74	4/10	7/31/96 17:54:28. 4	2-3 ft tall peak	1969853.5	231571.2	29.303449 06	91.4279509	
B75	4/12	7/4/96 10:44:08. 6	4-5 ft tall peak	1961658.1	220579.2	29.273157 29	91.4535474	
B76	4/15	7/4/96 10:58:53. 3	2-3 ft deep depression	1959219.2	216688.2	29.262485 68	91.4612643	
B77	4/15	7/4/96 11:21:28. 1	2-3 ft deep depression	1966314.7	225713.5	29.287330 34	91.4390363	
B78	4/15	7/4/96 11:21:34. 0	2-3 ft deep depression	1966345.5	225760.5	29.287461 13	91.4389389	
B79	4/16	7/4/96 09:45:48. 5	2-3 ft tall peak	1962196.1	220189.5	29.272131 64	91.4519350	
B80	4/16	7/4/96 09:46:23. 7	(2) 2-3 ft deep depressions	1962383.6	220415.2	29.272750 65	91.4513493	

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	CORRELATIONS
B81	4/16	7/4/96 09:55:36. 4	2 ft deep depression	1965100.2	223931.0	29.282427 61	91.4428391	A155, A156, A157
B82	4/16	7/4/96 09:55:42. 5	2 ft deep depression	1965133.0	223968.4	29.282530 32	91.4427363	A155, A156, A157
B83	4/16	7/4/96 09:56:22. 6	2 ft deep depression	1965314.4	224229.4	29.283248 50	91.4421682	A155, A156, A157
B84	4/17	7/4/96 08:20:35. 7	5 ft deep depression	1969570.1	229414.5	29.297475 86	91.4287550	M858
B85	5/1	8/3/96 10:23:57. 3	2-3 ft deep depression	1976502.6	242383.3	29.333154 00	91.4070973	
B86	5/1	8/3/96 10:14:12. 4	2-3 ft deep depression	1980092.6	246976.3	29.345792 45	91.3958409	
B87	5/2	8/3/96 11:38:56. 3	2-3 ft deep depression	1976351.5	241956.3	29.331979 36	91.4075706	
B88	5/2	8/3/96 11:31:27. 0- 11:31:35. 7	convoluted bottom surface with 3-5 ft tall/deep peaks/depressions	1978727.9	244881.5	29.340020 63	91.4001058	
B89	5/2	8/3/96 11:27:56. 6- 11:28:02. 2	(2) adjacent 5 ft deep depressions	1979697.6	246324.5	29.343997 85	91.3970782	M875

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	CORRELATIONS
B90	5/2	8/3/96 11:24:32. 4	2-3 ft deep depression	1980895.2	247759.2	29.347941 86	91.3933081	
B91	5/3	8/3/96 10:56:04. 0	9 ft deep flat-bottomed depression	1973327.3	237855.6	29.320739 29	91.4170016	M904
B92	5/3	8/3/96 11:10:05. 4	5 ft deep depression	1977960.1	243868.2	29.337288 96	91.4024870	
B93	5/3	8/3/96 11:16:54. 7	2-3 ft deep depression	1980061.2	246472.3	29.344446 68	91.3958867	
B94	5/3	8/3/96 11:18:41. 6	5 ft deep depression	1980580.1	247192.8	29.346427 97	91.3942580	
B95	5/3	8/3/96 11:18:49. 1	4 ft deep depression	1980615.2	247247.0	29.346576 39	91.3941472	
B96	5/3	8/3/96 11:19:12. 7	5 ft deep depression	1980746.2	247395.8	29.346986 39	91.3937368	
B97	5/3	8/3/96 11:19:16. 4	4 ft deep depression	1980771.4	247422.2	29.347058 85	91.3936578	
B98	5/4	8/3/96 12:31:21. 1	3 ft deep depression	1977495.9	242883.8	29.334578 19	91.4039359	M926
B99	5/4	8/3/96 12:34:14. 1	3 ft deep flat-bottomed depression	1978297.9	244016.7	29.337693 95	91.4014197	M928

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	CORRELATIONS
B100	5/4	8/3/96 12:35:02. 6	3 ft deep depression	1978557.3	244311.7	29.338500 00	91.4006000	M929
B101	5/4	8/3/96 12:36:05. 0- 12:38:19. 2	convoluted bottom surface with 2-3 ft tall/deep peaks/depressions	1979027.9	244838.0	29.339950 00	91.3991257	M930
B102	5/4	8/3/96 12:39:59. 9	4-5 ft deep depression	1979535.0	245655.3	29.342203 39	91.3975422	
B103	5/4	8/3/96 12:44:04. 1	3-4 ft deep depression	1980796.2	247172.1	29.346363 02	91.3935740	
B104	5/5	8/3/96 13:39:09. 4	3-4 ft deep depression	1974361.3	238547.1	29.322596 55	91.4138034	
B105	5/5	8/3/96 13:33:08. 6	3-4 ft deep depression	1976278.7	241022.9	29.329409 53	91.4077936	M941, M942
B106	5/5	8/3/96 13:23:11. 4	2-3 ft deep depression	1979341.9	245037.9	29.340458 51	91.3981915	
B107	5/5	8/3/96 13:21:41. 7	2-3 ft deep depression	1979869.3	245640.9	29.342118 68	91.3965386	M936
B108	5/5	8/3/96 13:20:37. 0	2-3 ft deep depression	1980232.8	246077.6	29.343311 95	91.3953849	

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	X (LA STATE PLANE [SOUTH] NAD-27 (FT))	Y (LA STATE PLANE [SOUTH] NAD-27 (FT))	LATITUDE	LONGITUDE	CORRELATIONS
B109	5/5	8/3/96 13:20:15. 9	2-3 ft deep depression	1980310.2	246262.1	29.343823 73	91.3951508	M935
B110	5/5	8/3/96 13:18:18. 9	3-4 ft deep depression	1981021.6	247034.4	29.345952 12	91.3929240	M934
B111	5/5	8/3/96 13:18:13. 9	3-4 ft deep depression	1981046.7	247069.5	29.346044 09	91.3928390	M934
B112	5/5	8/3/96 13:17:32. 9	2-3 ft deep depression	1981227.5	247380.5	29.346897 32	91.3922676	M934
B113	5/5	8/3/96 13:16:24. 5- 13:16:15. 8	convoluted bottom surface with 2-3 ft tall/deep peaks/depressions	1981599.9	247925.2	29.348404 53	91.3911121	M933
B114	5/6	8/3/96 14:23:03. 0	2-3 ft deep depression	1978546.2	243799.5	29.337095 44	91.4006379	
B115	5/6	8/3/96 14:30:33. 3	2-3 ft deep depression	1980961.9	246962.0	29.345799 50	91.3930670	
B116	5/6	8/3/96 14:31:56. 8	2-3 ft deep depression	1981457.9	247525.9	29.347339 44	91.3914992	
B117	5/7	8/3/96 14:44:13. 4	5 ft deep depression	1979355.6	244532.7	29.339069 28	91.3981474	

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	CORRELATIONS
B118	5/12	8/4/96 11:18:41. 7	2-3 ft tall peak	1977043.3	240263.0	29.327322 33	91.4053943	
B119	5/13	8/4/96 10:28:42. 3	2-3 ft tall peak	1976769.5	239734.7	29.325912 70	91.4062040	

APPENDIX IV

INVENTORIES OF MAGNETIC ANOMALIES DISCOVERED IN INITIAL SURVEY

**INVENTORY OF MAGNETIC ANOMALIES AT ATCHAFALAYA ODMDS
SURVEY BLOCK - 1**

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M1	1/1	7/4/96 16:21:12.9- 16:22:11.0	220.0D	58.0	1931862.3	185255.6	29.17549899	91.5471118	212.0	
M2	1/2	7/5/96 11:22:58.8- 11:23:48.1	436.0D	49.3	1932169.5	185333.5	29.17573357	91.5461831	216.5	
M3	1/3	7/5/96 13:56:04.0- 13:56:59.6	190.5D	55.6	1932396.5	185354.1	29.17579914	91.5454842	218.0	
M4	1/3	7/5/96 13:54:35.8- 13:54:22.0	10.0-	13.8	1933036.9	186250.5	29.17829548	91.5435226	223.3	A6
M5	1/4	7/5/96 12:38:02- 12:39:08	346.0D	66.0	1932646.1	185398.9	29.17594916	91.5447392	222.8	
M6	1/4	7/5/96 12:37:18.8- 12:37:27.6	18.0-	8.8	1933033.2	185887.6	29.17729178	91.5435249	222.3	
M7	1/5	7/5/96 15:13:05.0- 15:13:36.1	170.5D	31.1	1932891.1	185475.7	29.17613669	91.5439367	218.2	
M8	1/5	7/5/96 15:12:36.5- 15:12:40.8	9.5-	4.3	1933132.1	185775.5	29.17697079	91.5431959	219.8	A12

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M9	1/6	7/5/96 11:05:18.1- 11:05:37.9	26.0D	19.8	1929504.3	180783.8	29.16398610	91.5538306	41.9	
M10	1/6	7/5/96 11:15:04.8- 11:15:37.6	275.0D	32.8	1933117.1	185546.8	29.17709626	91.5425303	43.1	A13
M11	1/7	7/5/96 12:30:56.2- 12:31:39.5	317.5M	43.3	1933442.4	185650.8	29.17741981	91.5415646	36.3	A15
M12	1/8	7/5/96 13:49:31.2- 13:50:16.1	568.5D	44.9	1933843.0	185870.3	29.17802448	91.5403089	36.5	
M13	1/9	7/5/96 14:47:38.9- 14:47:52.1	34.0+	13.2	1926987.8	176802.5	29.15305833	91.5617417	35.3	A17
M14	1/9	7/5/96 14:49:59.9- 14:50:46.5	54.5M	46.6	1927923.9	178045.9	29.15647018	91.5587965	37.8	
M15	1/9	7/5/96 14:52:20.8- 14:52:35.6	66.0D	14.8	1928631.9	178980.9	29.15903613	91.5565704	39.6	
M16	1/9	7/5/96 14:55:28.5- 14:55:45.0	71.0D	16.5	1929762.8	180393.3	29.16293460	91.5530487	38.0	
M17	1/9	7/5/96 14:59:07.4- 14:59:31.6	11.0M	26.9	1931111.4	182067.5	29.16755039	91.5488411	37.0	
M18	1/9	7/5/96 15:03:16.3- 15:06:10.2	12.0-	173.9	1932904.0	184441.9	29.17409117	91.5432422	36.6	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M19	1/9	7/5/96 15:07:15.0- 15:08:04.4	155.0M	49.4	1933876.1	185840.3	29.17790195	91.5401471	44.1	
M20	1/11	7/5/96 09:03:39.6- 09:03:53.3	9.0D	13.7	1924140.6	172715.8	29.14099818	91.5712676	217.7	
M21	1/11	7/5/96 09:03:06.7- 09:03:18.7	12.0D	12.0	1924359.3	173023.3	29.14185119	91.5705943	219.0	
M22	1/11	7/5/96 08:55:53.3- 08:56:45.5	35.5D	52.2	1926741.6	176084.3	29.15020425	91.5631138	214.3	
M23	1/11	7/5/96 08:54:09.6- 08:54:23.3	9.0M	13.7	1927453.6	176949.6	29.15268882	91.5609312	219.6	
M24	1/11	7/5/96 08:48:06.7- 08:48:15.5	39.5-	8.8	1929490.7	179599.0	29.15995967	91.5545570	218.4	A22
M25	1/11	7/5/96 08:41:28.8- 08:41:55.8	60.5+	27.0	1931714.9	182338.9	29.16755166	91.5476661	226.7	
M26	1/11	7/5/96 08:35:44.1- 08:36:41.1	98.5M	177.0	1933154.7	184246.6	29.17276400	91.5431123	219.3	
M27	1/11	7/5/96 08:33:50.0 08:34:03.7	40.0-	13.7	1934226.3	185640.8	29.17660356	91.5397631	219.4	
M28	1/12	7/5/96 09:22:21.6- 09:23:31.6	53.0M	70.0	1923750.4	171968.4	29.13974678	91.5718521	35.2	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M29	1/12	7/5/96 09:26:22.9- 09:26:39.4	38.0D	16.5	1925132.8	173626.0	29.14430850	91.5675248	36.2	
M30	1/12	7/5/96 09:30:45.6- 09:31:41.0	32.5M	55.4	1926807.4	175786.4	29.15029489	91.5623645	27.7	
M31	1/12	7/5/96 09:34:12.3- 09:34:28.7	17.0+	16.4	1927973.3	177204.2	29.15418978	91.5586979	30.4	
M32	1/12	7/5/96 09:41:34.9- 09:41:42.6	16.0+	7.7	1930550.2	180669.7	29.16369661	91.5505801	38.4	A24
M33	1/12	7/5/96 09:45:36.3- 09:45:51.6	12.0-	15.3	1932076.2	182630.8	29.16908203	91.5457885	41.3	A26
M34	1/12	7/5/96 09:46:35.1- 09:46:44.1	14.0-	9.0	1932440.5	183066.0	29.17028880	91.5446612	39.8	
M35	1/12	7/5/96 09:47:41.2- 09:51:56.0	225.5M	254.8	1933613.7	184572.6	29.17444186	91.5409999	39.0	A27
M36	1/13	7/5/96 07:48:30.1- 07:49:55.5	45.5M	85.4	1923489.0	171319.5	29.13716618	91.5733170	220.0	
M37	1/13	7/5/96 07:46:35.9- 07:47:06.2	196.5D	30.3	1924269.3	172351.2	29.14001233	91.5708862	220.8	
M38	1/13	7/5/96 07:40:30.1- 07:41:15.1	13.5M	45.0	1926324.4	174957.6	29.14720234	91.5644810	222.9	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 (FT))	Y (LA STATE PLANE [SOUTH] NAD-27 (FT))	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M39	1/13	7/5/96 07:19:04.2- 07:20:54.0	1,391.0-	109.8	1933372.9	184000.5	29.17208439	91.5424215	218.6	A28
M40	1/13	7/5/96 07:17:21.1- 07:17:43.6	1,455.5+	22.5	1934191.4	185092.3	29.17514766	91.5399357	228.6	
M41	1/14	7/5/96 07:57:30.3- 07:58:13.6	82.0D	43.3	1923151.7	170652.4	29.13612536	91.5737203	35.0	
M42	1/14	7/5/96 08:01:39.3- 08:02:46.3	38.5M	67.0	1924650.5	172496.3	29.14118934	91.5690127	38.1	
M43	1/14	7/5/96 08:04:15.0- 08:04:25.4	13.0+	10.4	1925432.8	173491.8	29.14395233	91.5666040	33.8	
M44	1/14	7/5/96 08:05:09.2- 08:05:24.0	60.0+	14.8	1925770.1	173953.2	29.14522067	91.5655460	34.3	
M45	1/14	7/5/96 08:20:18.3- 08:20:37.6	291.5-	19.3	1931218.7	180985.0	29.16456816	91.5484894	38.2	
M46	1/14	7/5/96 08:26:25.6- 08:27:39.2	3,416.0M	73.6	1933518.1	183882.5	29.17256226	91.5413252	35.3	A29
M47	1/15	7/4/96 18:17:21.7- 18:18:00.1	23.0D	38.4	1923149.4	170390.4	29.13459922	91.5743595	218.0	
M48	1/15	7/4/96 18:09:48.1- 18:10:00.1	38.0-	12.0	1925759.5	173721.7	29.14375729	91.5661760	214.3	A35

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M49	1/15	7/4/96 18:07:54.1- 18:08:46.7	32.5M	52.6	1926293.9	174361.3	29.14554772	91.5645523	220.1	
M50	1/15	7/4/96 17:42:18.0- 17:53:10.5	7.676M	628.32	1933558.5	183865.7	29.17178973	91.5419305	231.4	A30, A31, B1
M51	1/16	7/5/96 06:39:46.7- 06:40:52.7	14.5M	66.0	1923140.2	170086.7	29.13455498	91.5737284	38.0	
M52	1/16	7/5/96 06:41:44.8- 06:41:50.8	12.0+	6.0	1923666.6	170804.3	29.13653158	91.5720845	38.0	
M53	1/16	7/5/96 07:03:31.7- 07:03:40.6	14.0-	8.9	1931476.2	180787.0	29.16402083	91.5476750	39.0	
M54	1/16	7/5/96 07:04:13.6- 07:13:01.8	1,146.0M	528.2	1933788.9	183711.7	29.17209469	91.5404777	35.0	A37, A38, A39, A40, A41, A42
M55	1/17	7/4/96 17:01:41.9- 17:02:33.0	22.5M	51.1	1923317.9	170025.3	29.13440866	91.5732080	33.5	
M56	1/17	7/4/96 17:08:35.9- 17:09:52.7	67.0M	76.8	1925624.9	172945.0	29.14244421	91.5659891	34.9	
M57	1/17	7/4/96 17:28:04.8- 17:33:23.9	571.0M	319.1	1932588.6	181903.7	29.16709714	91.5441960	39.1	A44
M58	1/17	7/4/96 17:33:27.3- 17:33:40.4	30.5+	13.1	1933692.7	183348.6	29.17108099	91.5407523	38.1	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M59	1/17	7/4/96 17:34:30.3- 17:35:27.3	322.5+	57.0	1934214.6	183980.4	29.17282416	91.5391258	37.5	
M60	1/17	7/4/96 17:36:19.7- 17:38:06.2	901.0D	106.5	1934923.8	184933.6	29.17544759	91.5369072	37.7	A45
M61	n/a	NOT AN ANOMALY	n/a	n/a	n/a	n/a	n/a	n/a	n/a	

**INVENTORY OF MAGNETIC ANOMALIES AT ATCHAFALAYA ODMDS
SURVEY BLOCK - 2**

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE LANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M62	2/1	7/4/96 15:43:58.1- 15:45:46.1	3.422.5M	108.0	1939690.1	195202.4	29.20293545	91.5227097	221.6	
M63	2/2	7/5/96 16:29:34.4- 16:29:46.4	11.5-	12.0	1934526.1	188337.9	29.18479559	91.5381544	40.0	A46, A47
M64	2/2	7/5/96 16:30:45.1- 16:30:55.5	12.0+	10.4	1934947.9	188831.9	29.18618483	91.5368818	34.2	A48
M65	2/2	7/5/96 16:32:09.1- 16:32:46.3	40.0M	37.2	1935421.6	189510.7	29.18802819	91.5353590	39.5	
M66	2/2	7/5/96 16:34:34.3- 16:34:44.8	13.5-	10.5	1936151.6	190419.4	29.19052767	91.5330723	40.0	
M67	2/2	7/5/96 16:35:25.4- 16:35:51.1	16.0+	25.7	1936502.3	190879.4	29.19179951	91.5319837	39.0	
M68	2/2	7/5/96 16:42:10.5- 16:45:46.3	3,278.0M	215.8	1939530.9	194761.8	29.20250618	91.5225386	35.7	
M69	2/2	7/5/96 16:48:55.7- 16:49:07.7	197.5-	12.0	1940810.3	196414.9	29.20702689	91.5184898	41.8	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE LANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M70	2/2	7/5/96 16:53:31.6- 16:53:40.4	66.0D	8.8	1942295.6	198271.5	29.21220228	91.5139540	28.2	
M71	2/2	7/5/96 16:54:09.1- 16:54:19.5	42.5D	10.4	1942467.5	198566.9	29.21298197	91.5133514	36.0	
M72	2/2	7/5/96 16:55:02.8- 16:55:08.8	67.5-	6.0	1942733.2	198945.3	29.21399270	91.5124740	42.0	
M73	2/2	7/5/96 16:55:18.2- 16:55:28.6	21.0+	10.4	1942830.6	199051.9	29.21428398	91.5121660	42.4	
M74	2/2	7/5/96 16:57:19.5- 16:57:27.2	60.5+	7.7	1943498.9	199856.0	29.21653317	91.5101278	35.7	
M75	2/2	7/5/96 16:58:04.5- 16:58:15.0	46.0-	10.5	1943729.6	200173.8	29.21740905	91.5094076	35.5	
M76	2/2	7/5/96 16:58:35.8- 16:58:47.8	204.0D	12.0	1943914.3	200431.7	29.21808633	91.5087803	41.8	
M77	2/2	7/5/96 16:59:48.1- 17:00:04.6	92.0-	16.5	1944337.6	200915.6	29.21944251	91.5074908	37.3	A49
M78	2/2	7/5/96 17:00:42.0- 17:00:54.1	21.5M	12.1	1944626.2	201299.0	29.22049069	91.5065760	38.8	
M79	2/3	7/5/96 13:46:49.7- 13:46:59.0	10.5D	9.3	1933797.9	187102.2	29.18062679	91.5411232	220.6	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE LANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M80	2/3	7/5/96 13:44:46.7- 13:44:21.6	32.5M	25.1	1934627.1	188246.1	29.18377337	91.5385266	220.0	
M81	2/3	7/5/96 13:40:13.9- 13:39:22.9	43.0M	51.0	1936459.7	190604.1	29.19025527	91.5327798	217.8	
M82	2/3	7/5/96 13:38:37.9- 13:38:51.1	18.0D	13.2	1936895.4	191121.2	29.19170107	91.5314489	221.9	
M83	2/3	7/5/96 13:31:44.0- 13:33:42.4	1,708.5M	118.4	1939264.2	194206.8	29.20018346	91.5240221	219.3	
M84	2/4	7/6/96 15:04:51.9- 15:05:05.4	12.5D	13.1	1934258.2	187542.3	29.18181972	91.5396538	216.8	
M85	2/4	7/6/96 15:03:21.7 15:03:39.7	5.0-	18.0	1934740.7	188298.1	29.18386228	91.5380718	208.0	
M86	2/4	7/6/96 15:00:51.7- 15:01:00.5	16.5D	8.8	1935812.9	189502.0	29.18722982	91.5348136	219.4	
M87	2/4	7/6/96 14:56:27.7- 14:57:06.8	23.5M	39.1	1937421.5	191562.1	29.19291517	91.5298015	221.8	B4
M88	2/4	7/6/96 14:50:56.1- 14:56:19.0	852.5M	322.9	1939002.0	193569.7	29.19844209	91.5248571	221.5	
M89	2/4	7/6/96 14:45:00.5- 14:45:29.1	5.0-	28.6	1941704.8	197086.9	29.20812067	91.5163960	220.4	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE LANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M90	2/4	7/6/96 14:45:02.1- 14:45:12.6	6.5+	10.5	1941818.8	197212.2	29.20847747	91.5160559	222.6	
M91	2/4	7/6/96 14:40:39.4- 14:41:09.5	37.0D	30.1	1943462.0	199330.0	29.21424701	91.5108132	209.8	
M92	2/4	7/6/96 14:40:09.8- 14:40:17.4	17.5-	7.6	1943713.2	199632.0	29.21513861	91.5101281	222.4	
M93	2/4	7/6/96 14:39:42.8- 14:39:48.4	9.0+	5.6	1943913.8	199857.0	29.21575462	91.5094954	221.7	
M94	2/4	7/6/96 14:37:36.7- 14:37:41.1	31.5+	4.4	1944642.2	200924.7	29.21864899	91.5071451	212.6	
M95	2/5	7/5/96 17:38:23.9- 17:38:31.6	7.0-	7.7	1934162.9	187130.5	29.18069183	91.5399582	217.8	
M96	2/5	7/5/96 17:35:27.0- 17:35:37.9	15.0-	10.9	1935269.5	188492.8	29.18443896	91.5364907	216.9	
M97	2/5	7/5/96 17:29:12.0 17:29:19.7	8.5D	7.7	1937570.8	191484.4	29.19266406	91.5292740	214.2	
M98	2/5	7/5/96 17:28:59.9- 17:29:07.6	9.0M	7.7	1937664.4	191582.8	29.19295352	91.5290114	218.0	
M99	2/5	7/5/96 17:28:43.5- 17:28:46.8	19.0+	3.3	1937769.2	191734.2	29.19335703	91.5286620	215.3	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE LANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M100	2/5	7/5/96 17:24:55.5- 17:28:34.6	2.079.0M	215.1	1938891.0	193170.1	29.19732404	91.5251760	218.0	
M101	2/5	7/5/96 17:20:46.8- 17:20:55.6	85.0-	8.8	1940689.8	195480.7	29.20367884	91.5195378	216.4	
M102	2/5	7/5/96 17:13:48.1- 17:14:04.5	14.5D	16.4	1943201.1	198670.3	29.21246979	91.5116969	218.2	
M103	2/5	7/5/96 17:10:30.2- 17:10:40.6	7.0-	10.4	1944420.1	200284.7	29.21690690	91.5078715	216.7	A50
M104	2/5	7/5/96 17:10:13.8- 17:10:20.9	25.5D	7.1	1944515.3	200436.1	29.21730306	91.5075368	212.2	
M105	2/5	7/5/96 17:08:16.4- 17:08:20.8	26.5+	4.4	1945227.3	201337.4	29.21985332	91.5054133	225.6	
M106	2/5	7/5/96 17:07:34.7- 17:07:40.7	18.5D	6.0	1945525.3	201587.2	29.22061576	91.5045527	237.1	
M107	2/6	7/6/96 12:37:32.9- 12:37:40.6	10.5+	7.7	1934257.9	186900.4	29.18085649	91.5390102	37.0	
M108	2/6	7/6/96 12:41:24.3- 12:41:33.2	6.0+	8.9	1935467.2	188498.2	29.18525111	91.5352215	38.1	
M109	2/6	7/6/96 12:46:33.0- 12:46:39.1	9.5-	6.1	1937121.0	190603.7	29.19105579	91.5300609	36.7	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE LANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M110	2/6	7/6/96 12:48:57.2- 12:52:30.1	1.803.0M	212.9	1938673.7	192617.3	29.19659147	91.5251919	38.5	A53
M111	2/6	7/6/96 12:58:05.9- 12:58:18.0	16.0D	12.1	1940830.9	195412.4	29.20428079	91.5184350	39.8	
M112	2/6	7/6/96 13:00:39.1- 13:00:55.7	6.5-	16.6	1941721.1	196440.0	29.20711302	91.5156536	39.4	
M113	2/6	7/6/96 13:01:25.4- 13:01:37.4	5.5+	12.0	1941965.1	196751.0	29.20800000	91.5149417	33.0	
M114	2/6	7/6/96 13:02:58.6- 13:03:10.7	14.0-	12.1	1942396.4	197411.1	29.20979505	91.5135549	37.7	
M115	2/6	7/6/96 13:10:48.0- 13:11:07.7	23.0M	19.7	1944858.0	200560.9	29.21846504	91.5058508	38.1	
M116	2/6	7/6/96 13:13:16.6- 13:13:21.0	6.0+	4.4	1945634.2	201510.4	29.22108529	91.5034320	36.9	
M117	2/7	7/6/96 13:53:16.6- 13:53:33.6	22.0-	17.0	1934242.1	186655.3	29.18019216	91.5390745	35.0	
M118	2/7	7/6/96 14:02:06.5- 14:02:27.4	10.0M	20.9	1936981.2	190213.2	29.18996348	91.5304699	40.2	
M119	2/7	7/6/96 14:02:45.4- 14:03:03.8	27.5D	18.4	1937204.7	190498.3	29.19075775	91.5297845	38.5	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE LANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M120	2/7	7/6/96 14:04:31.8- 14:08:13.9	2.912.0M	222.1	1938529.8	192140.6	29.19529531	91.5256654	35.4	A55, A56, A57
M121	2/7	7/6/96 14:10:00.3- 14:10:09.6	41.5D	9.3	1939477.9	193373.4	29.19866784	91.5226655	39.8	
M122	2/7	7/6/96 14:11:14.0- 14:11:21.6	23.0+	7.6	1939863.9	193865.0	29.20003587	91.5214808	36.9	
M123	2/7	7/6/96 14:12:13.9- 14:12:28.7	85.0D	14.8	1940201.8	194345.4	29.20134562	91.5204044	39.5	
M124	2/7	7/6/96 14:14:48.4- 14:15:06.5	5.5+	18.1	1941075.6	195391.6	29.20425280	91.5177139	34.1	
M125	2/7	7/6/96 14:15:24.6- 14:15:35.1	8.0D	10.5	1941203.1	195587.5	29.20480104	91.5173323	32.1	
M126	2/7	7/6/96 14:16:32.2- 14:16:44.3	15.5+	12.1	1941541.5	196051.6	29.20606015	91.5162398	36.2	
M127	2/7	7/6/96 14:17:03.4- 14:17:21.4	9.5D	18.0	1941728.8	196287.7	29.20671113	91.5156555	36.0	
M128	2/7	7/6/96 14:19:44.2- 14:19:53.0	16.0-	8.8	1942544.3	197342.4	29.20959684	91.5130761	39.6	
M129	2/7	7/6/96 14:21:50.2- 14:22:00.7	19.0+	10.5	1943235.6	198141.9	29.21179368	91.5109063	40.5	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE LANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M130	2/7	7/6/96 14:23:57.4- 14:24:07.9	46.5-	10.5	1943871.5	198971.9	29.21411224	91.5089711	33.7	
M131	2/7	7/6/96 14:26:14.1- 14:26:32.2	34.5D	18.1	1944594.8	199910.4	29.21688935	91.5086960	35.2	
M132	2/8	7/6/96 15:22:14.1- 15:24:51.7	3,157.5M	157.6	1938360.2	191697.2	29.19406133	91.5261720	38.2	A60, A61
M133	2/8	7/6/96 15:29:21.9- 15:29:33.9	51.0D	12.0	1940157.2	194006.3	29.20043042	91.5205696	36.0	
M134	2/8	7/6/96 15:32:38.3- 15:32:47.1	7.5D	8.8	1941131.7	195315.8	29.20399622	91.5174640	43.5	
M135	2/8	7/6/96 15:38:14.3- 15:38:33.7	650.5D	19.4	1943005.5	197649.7	29.21045866	91.5116553	36.7	
M136	2/8	7/6/96 15:41:05.1- 15:41:49.0	9.0M	43.9	1943990.3	198896.5	29.21388320	91.5085612	38.3	
M137	2/8	7/6/96 15:46:18.9- 15:46:23.3	15.0-	4.4	1945555.8	200937.4	29.21949397	91.5036514	39.9	
M138	2/8	7/6/96 15:47:08.2- 15:47:19.2	7.0D	11.0	1945623.8	201302.4	29.22046488	91.5027685	46.0	
M139	2/9	7/6/96 12:31:52.3- 12:32:22.6	291.0M	23.7	1934140.5	186042.8	29.17768626	91.5399980	214.8	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE LANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M140	2/9	7/6/96 12:29:28.6- 12:29:45.0	27.5-	16.4	1935129.5	187305.0	29.18119840	91.5369622	222.0	
M141	2/9	7/6/96 12:25:04.7- 12:25:17.9	21.0+	13.2	1936770.8	189417.9	29.18698464	91.5317820	215.7	
M142	2/9	7/6/96 12:19:26.9- 12:22:09.1	18.389.0-	162.2	1938342.9	191522.8	29.19298464	91.5270640	247.4	A62
M143	2/9	7/6/96 12:15:48.2- 12:16:01.3	25.0D	13.1	1940103.6	193685.1	29.19874694	91.5213798	218.2	
M144	2/9	7/6/96 12:09:04.6- 12:09:44.7	138.5M	40.1	1942472.7	196811.4	29.20733958	91.5139458	215.1	
M145	2/9	7/6/96 12:08:16.3- 12:08:20.6	11.5-	4.3	1942892.0	197322.5	29.20875449	91.5126470	216.7	
M146	2/9	7/6/96 12:07:47.7- 12:08:04.2	92.0D	16.5	1943021.8	197480.3	29.20919372	91.5122486	217.7	
M147	2/9	7/6/96 12:07:01.6- 12:07:20.8	80.5D	19.2	1943337.5	197837.0	29.21019948	91.5112948	222.1	
M148	2/9	7/6/96 12:03:43.4- 12:03:53.9	27.5+	10.5	1944591.7	199506.2	29.21475645	91.5073124	214.5	
M149	2/9	7/6/96 12:02:37.6- 12:02:44.8	6.5-	7.2	1944944.0	200022.0	29.21617406	91.5062062	214.0	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE LANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M150	2/9	7/6/96 11:59:40.4- 11:59:50.8	10.5+	10.4	1946060.6	201337.2	29.21990449	91.5028516	233.3	
M151	2/10	7/6/96 11:11:41.5- 11:13:32.7	767.5M	111.2	1934740.3	186516.9	29.17903945	91.5381908	223.8	
M152	2/10	7/6/96 10:57:02.6- 11:05:26.8	28,648.0M	444.2	1938412.6	191457.6	29.19263779	91.5267021	222.7	A84
M153	2/10	7/6/96 10:50:29.3- 10:51:14.4	79.0M	45.1	1942321.2	196244.3	29.20578867	91.5144337	217.1	A81, A82
M154	2/10	7/6/96 10:47:10.1- 10:49:51.9	24.5M	161.8	1943103.5	197279.1	29.20864531	91.5119987	218.6	A76, A77, A78, A79, A80
M155	2/10	7/6/96 10:44:41.6- 10:44:59.3	54.5-	17.7	1944533.5	198998.3	29.21335879	91.5074912	214.4	A69, A70, A71
M156	2/10	7/6/96 10:44:09.7- 10:44:15.8	5.5+	6.1	1944726.5	199276.0	29.21411989	91.5068812	213.6	
M157	2/10	7/6/96 10:42:39.7- 10:43:11.6	10.0M	31.9	1945093.3	199870.5	29.21574797	91.5057187	211.7	A65, A66
M158	2/10	7/6/96 10:39:51.6- 10:41:12.9	15.5M	81.3	1945969.8	200937.4	29.21879805	91.5031279	232.2	A63
M159	2/11	7/5/96 17:45:31.9- 17:51:51.0	901.0M	379.1	1935911.3	187799.0	29.18331427	91.5338024	41.1	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE LANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M160	2/11	7/5/96 17:53:09.5- 18:00:16.8	2,753.0M	427.3	1937996.1	190470.9	29.19068320	91.5273001	39.0	
M161	2/11	7/5/96 18:05:11.0- 18:05:27.5	56.5D	16.5	1940632.8	193802.3	29.19988945	91.5191105	32.1	
M162	2/11	7/5/96 18:07:39.4- 18:07:49.8	9.0-	10.4	1941397.7	194864.0	29.20276891	91.5166470	41.0	
M163	2/11	7/5/96 18:08:37.6- 18:09:51.3	16.0M	73.7	1941885.7	195426.8	29.20434180	91.5151555	36.5	
M164	2/11	7/5/96 18:11:40.8- 18:11:52.8	20.0-	12.0	1942826.5	196567.0	29.20748383	91.5122162	36.0	
M165	2/11	7/5/96 18:13:10.8- 18:13:53.1	24.0M	42.3	1943396.5	197386.5	29.20974948	91.5104505	34.0	
M166	2/11	7/5/96 18:19:02.0- 18:19:26.0	13.5+	24.0	1945268.0	199771.4	29.21630625	91.5045792	36.0	
M167	2/11	7/5/96 18:21:27.6- 18:21:45.1	12.0+	17.5	1946038.7	200814.6	29.21913904	91.5021110	43.4	A89
M168	2/12	7/6/96 09:46:47.0- 09:50:08.2	2,937.0M	201.2	1937544.2	189630.4	29.18759245	91.5293909	219.7	
M169	2/12	7/6/96 09:43:48.5- 09:44:30.7	669.0D	42.2	1939280.8	191818.0	29.19361940	91.5239648	220.3	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE LANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M170	2/12	7/6/96 09:35:23.0- 09:36:05.3	41.5D	42.3	1942112.2	195479.8	29.20368411	91.5150826	216.8	A97, A98, A99, A100
M171	2/12	7/6/96 09:32:51.7- 09:33:05.3	8.5D	13.6	1943077.8	196645.0	29.20690313	91.5120786	218.9	A93
M172	2/12	7/6/96 09:29:57.8- 09:30:05.0	9.0D	7.2	1944052.1	197979.9	29.21061699	91.5090828	225.9	
M173	2/12	7/6/96 09:26:08.2- 09:26:18.7	23.0-	10.5	1945312.3	199630.6	29.21508262	91.5050174	210.2	
M174	2/13	7/6/96 08:39:11.1- 08:39:33.1	25.0D	22.0	1935515.4	186717.2	29.17957435	91.5357363	220.2	
M175	2/13	7/6/96 08:32:04.6- 08:35:13.9	4,828.0M	189.3	1937348.0	189090.1	29.18609583	91.5299875	217.8	
M176	2/13	7/6/96 08:20:28.9- 08:29:13.8	879.0M	524.9	1939568.1	191907.4	29.19384261	91.5230271	215.5	A108
M177	2/13	7/6/96 08:18:54.1- 08:18:42.0	6.0-	12.1	1941912.9	195057.7	29.20249602	91.5156569	210.9	
M178	2/13	7/6/96 08:16:48.3- 08:16:58.8	5.0+	10.5	1942588.9	195854.6	29.20471735	91.5135913	216.9	
M179	2/13	7/6/96 08:10:54.3- 08:11:01.5	13.0+	7.2	1944442.5	198243.2	29.21126882	91.5077479	211.4	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE LANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M180	2/13	7/6/96 08:04:46.5- 08:04:57.0	5.0+	10.5	1946316.1	200705.2	29.21807699	91.5019397	217.9	
M181	2/14	7/6/96 11:18:03.8- 11:18:13.2	7.0-	9.4	1935068.9	185820.0	29.17789354	91.5364699	36.2	
M182	2/14	7/6/96 11:19:44.8- 11:20:10.1	19.0D	25.3	1935685.7	186628.7	29.18009368	91.5345011	41.4	
M183	2/14	7/6/96 11:21:25.3- 11:21:40.1	143.0D	12.7	1936176.5	187310.7	29.18200833	91.5330250	34.0	
M184	2/14	7/6/96 11:23:14.4- 11:26:14.7	3,102.0M	180.3	1937161.4	188595.1	29.18551113	91.5298916	40.8	
M185	2/14	7/6/96 11:32:05.6- 11:32:58.4	537.5D	52.8	1939762.5	191956.6	29.19477721	91.5217728	38.9	
M186	2/14	7/6/96 11:36:38.7- 11:42:13.2	931.0M	334.5	1941630.4	194310.3	29.20126443	91.5159404	37.7	A109
M187	2/14	7/6/96 11:45:05.6- 11:45:37.4	111.5M	31.8	1943929.6	197254.6	29.20937048	91.5087475	37.8	A109, A110
M188	2/14	7/6/96 11:46:11.9- 11:46:25.1	12.5-	13.2	1944209.8	197614.8	29.21036217	91.5078712	37.8	A109
M189	2/15	7/6/96 10:05:14.4- 10:08:57.6	3,637.5M	223.2	1937121.3	188324.2	29.18479655	91.5300635	34.8	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE LANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M190	2/15	7/6/96 10:15:36.8- 10:16:14.0	1,021.5D	37.2	1940102.1	192090.5	29.19515898	91.5207282	36.5	
M191	2/15	7/6/96 10:25:02.4- 10:27:11.2	1,040.5M	128.8	1943384.4	196332.6	29.20683984	91.5104634	36.4	A113, B8
M192	2/15	7/6/96 10:28:26.3- 10:28:36.7	14.5-	10.4	1944286.7	197507.5	29.21006634	91.5076280	38.0	A115, A116
M193	2/15	7/6/96 10:31:33.9- 10:31:38.4	14.0+	4.5	1945331.7	198819.4	29.21366333	91.5043667	37.1	A120, A121
M194	2/16	7/6/96 08:49:30.5- 08:52:55.9	2,530.0M	205.4	1937039.2	187924.3	29.18368950	91.53003070	36.2	
M195	2/16	7/6/96 8:54:48.6- 08:54:55.7	9.5+	7.1	1938277.2	189521.9	29.18807345	91.5264121	39.3	
M196	2/16	7/6/96 09:00:27.7- 09:01:00.6	1,567.0D	32.9	1940406.9	192243.9	29.19558001	-91.5197700	37.0	
M197	2/16	7/6/96 09:02:48.2- 09:02:57.5	51.0+	9.3	1941091.7	193117.62	29.19798504	-91.5176272	37.2	
M198	2/16	7/6/96 09:04:29.2- 09:04:36.4	7.5D	7.2	1941785.2	193962.1	29.20031982	-91.5154734	35.2	
M199	2/16	7/6/96 09:07:48.3- 09:08:42.6	37.0M	54.3	1943031.2	195616.2	29.20483356	-91.5115164	43.0	A131, A132

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE LANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M200	2/16	7/6/96 09:10:15.3- 09:13:26.0	901.0M	190.7	1944341.4	197318.4	29.20954005	91.5074455	39.3	
M201	2/16	7/6/96 09:13:26.0- 09:17:42.5	1,114.0M	256.5	1945505.8	198731.7	29.21343125	91.5038021	39.4	A134, A135, A136, A137, B10, B11
M202	2/17	7/6/96 07:27:31.5- 07:27:53.9	838.5+	22.4	1935125.1	185188.6	29.17613198	91.5362514	41.2	
M203	2/17	7/6/96 07:30:05.9- 07:34:49.4	1,859.5M	283.5	1936982.8	187552.1	29.18267276	91.5304939	34.7	

**INVENTORY OF MAGNETIC ANOMALIES AT ATCHAFALAYA ODMDS
SURVEY BLOCK 3**

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M204	3/1	7/4/96 14:40:07.3- 14:40:13.3	15.0-	6.0	1956727.0	217105.3	29.26322067	91.4693753	219.0	
M205	3/1	7/4/96 14:40:31.4- 14:40:41.8	31.5M	10.4	1956588.7	216931.5	29.26271471	91.4697624	213.3	
M206	3/1	7/4/96 14:41:03.0- 14:41:28.2	44.5M	25.2	1956392.7	216647.4	29.26194818	91.4704027	216.5	
M207	3/1	7/4/96 14:41:43.5- 14:41:47.9	8.0+	4.4	1956237.5	216435.3	29.26139748	91.4709371	222.8	
M208	3/1	7/4/96 14:41:55.1- 14:42:02.8	147.5D	7.7	1956156.1	216368.5	29.26120401	91.4711793	221.1	
M209	3/1	7/4/96 14:43:24.0- 14:43:34.4	33.0M	10.4	1955645.6	215727.6	29.25941608	91.4727420	216.5	
M210	3/1	7/4/96 14:44:13.4- 14:44:15.0	49.5-	1.6	1955431.0	215390.3	29.25850019	91.4734330	219.0	
M211	3/1	7/4/96 14:44:38.7- 14:44:42.0	19.0-	3.3	1955288.4	215220.7	29.25802819	91.4738718	218.0	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M212	3/1	7/4/96 14:46:14.7- 14:46:22.4	21.0+	7.7	1954750.8	214573.8	29.25627508	91.4755944	223.2	
M213	3/1	7/4/96 14:46:53.7- 14:46:57.0	63.0+	3.3	1954509.3	214307.3	29.25550958	91.4763047	217.1	
M214	3/1	7/4/96 14:47:05.8- 14:47:10.7	635.5D	4.9	1954428.6	214212.6	29.25523432	91.4765327	214.1	
M215	3/1	7/4/96 14:49:19.4- 14:49:34.7	97.5D	15.3	1953706.6	213208.8	29.25248477	91.4788157	216.9	
M216	3/1	7/4/96 14:51:01.4- 14:51:10.3	52.5D	8.9	1953159.2	212490.7	29.25050659	91.4805267	216.6	
M217	3/1	7/4/96 14:51:31.8- 14:51:40.5	28.5+	8.7	1953018.5	212298.9	29.24999345	91.4809899	219.5	
M218	3/1	7/4/96 14:53:04.5- 14:53:08.9	35.5-	4.4	1952504.9	211648.7	29.24821667	91.4826167	222.0	
M219	3/1	7/4/96 14:54:44.9- 14:54:58.6	118.0D	13.7	1951887.6	210875.2	29.24608601	91.4845473	221.8	
M220	3/1	7/4/96 14:55:35.9- 14:55:39.2	13.5-	3.3	1951642.8	210597.6	29.24529299	91.4852702	216.2	
M221	3/1	7/4/96 14:56:55.4- 14:57:22.3	44.5M	26.9	1951177.9	209956.8	29.24354021	91.4867431	218.4	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M222	3/1	7/4/96 14:57:49.7- 14:58:01.3	37.0+	11.6	1950888.8	209562.1	29.24245985	91.4876568	219.6	
M223	3/1	7/4/96 14:58:20.9- 14:58:25.3	15.0-	4.4	1950747.3	209394.1	29.24199181	91.4880915	218.5	
M224	3/1	7/4/96 14:58:39.0- 14:58:43.4	41.5-	4.4	1950648.7	209262.4	29.24164625	91.4884247	221.7	
M225	3/1	7/4/96 14:59:07.4- 14:59:16.2	52.0+	8.8	1950466.4	209047.0	29.24103114	91.4889626	217.5	
M226	3/1	7/4/96 15:00:06.1- 15:00:14.9	210.0D	8.8	1950153.4	208625.1	29.23987154	91.4899451	217.9	
M227	3/1	7/4/96 15:01:00.0- 15:01:04.3	19.5-	4.3	1949837.6	208262.1	29.23888300	91.4909503	220.0	
M228	3/1	7/4/96 15:01:18.1- 15:01:31.3	158.5M	13.2	1949711.3	208104.4	29.23846530	91.4913680	223.0	
M229	3/1	7/4/96 15:01:47.7- 15:01:51.0	28.5-	26.67	1949566.7	207940.3	29.23797881	91.4917697	216.4	
M230	3/1	7/4/96 15:02:55.6- 15:03:07.2	18.5M	11.6	1949138.4	207362.9	29.23639583	91.4931202	219.3	
M231	3/1	7/4/96 15:03:46.7- 15:03:51.1	11.0-	4.4	1949937.0	207058.7	29.23560390	91.4938128	226.0	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M232	3/1	7/4/96 15:04:05.9- 15:04:09.2	46.0-	3.3	1948801.2	206934.0	29.23522392	91.4941896	219.4	
M233	3/1	7/4/96 15:04:36.2- 15:06:38.9	172.0M	122.7	1948284.6	206282.0	29.23342816	91.4958052	219.3	
M234	3/1	7/4/96 15:07:11.8- 15:07:19.4	15.0D	7.6	1947711.5	205586.1	29.23147873	91.4975420	212.3	
M235	3/1	7/4/96 15:08:04.3- 15:09:55.3	49.5M	101.0	1947221.2	204906.6	29.22961537	91.4990898	213.9	
M236	3/1	7/4/96 15:10:43.5- 15:10:49.6	8.0+	6.1	1946567.0	204017.4	29.22720828	91.5012001	222.0	
M237	3/1	7/4/96 15:11:04.4- 15:11:13.3	10.5M	8.9	1946426.5	203879.1	29.22680658	91.5016101	218.1	
M238	3/1	7/4/96 15:11:25.3- 15:11:34.5	33.0M	9.2	1946296.2	203701.1	29.22631634	91.5020172	218.0	
M239	3/1	7/4/96 15:13:08.9- 15:13:19.3	84.5+	10.4	1945713.5	202954.5	29.22425074	91.5038239	216.0	
M240	3/1	7/4/96 15:14:48.0- 15:14:56.8	26.0M	8.8	1945173.2	202218.0	29.22227879	91.5055919	226.3	
M241	3/2	7/6/96 16:34:26.2- 16:34:31.1	73.5+	4.9	1957215.9	217447.7	29.26420000	91.4678917	225.5	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M242	3/2	7/6/96 16:36:10.1- 16:36:12.8	39.0-	2.7	1956608.1	216698.9	29.26207786	91.4697055	213.8	
M243	3/2	7/6/96 16:36:34.2- 16:36:44.6	70.0D	10.4	1956455.8	216491.8	29.26153584	91.4702283	222.3	
M244	3/2	7/6/96 16:37:07.1- 16:37:15.8	18.5M	8.7	1956254.5	216255.9	29.26085684	91.4708098	213.5	
M245	3/2	7/6/96 16:37:44.4- 16:37:48.8	10.5+	4.4	1956066.2	215964.0	29.26008145	91.4714457	219.3	
M246	3/2	7/6/96 16:38:09.7- 16:38:19.0	242.5D	9.3	1955899.8	215768.9	29.25952116	91.4719288	216.1	
M247	3/2	7/6/96 16:38:45.9- 16:38:50.4	25.5D	4.5	1955717.1	215522.1	29.25884840	91.4725122	215.9	
M248	3/2	7/6/96 16:40:30.7- 16:40:38.4	68.5+	7.7	1955076.3	214722.0	29.25665307	91.4745303	217.4	
M249	3/2	7/6/96 16:41:11.3- 16:41:17.4	11.5M	6.1	1954843.4	214438.1	29.25587340	91.4752622	217.7	
M250	3/2	7/6/96 16:42:30.8- 16:42:33.8	7.5+	3.0	1954393.1	213850.4	29.25425781	91.4766755	218.2	
M251	3/2	7/6/96 16:43:17.4- 16:43:29.5	17.5M	12.1	1954111.7	213480.8	29.25323529	91.4775480	217.1	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M252	3/2	7/6/96 16:43:50.3- 16:43:56.3	195+	6.0	1953937.2	213241.4	29.25255664	91.4780600	212.9	
M253	3/2	7/6/96 16:45:49.2- 16:45:51.9	549.5-	2.7	1953249.1	212374.3	29.25019401	91.4802560	218.1	
M254	3/2	7/6/96 16:46:42.9- 16:46:47.4	8.5-	4.5	1952903.8	211976.4	29.24909531	91.4813320	217.4	B17
M255	3/2	7/6/96 16:46:55.0- 16:46:59.4	27.0-	4.4	1952847.2	211898.3	29.24887340	91.4814978	216.0	B17
M256	3/2	7/6/96 16:47:26.4- 16:47:30.8	63.0D	4.4	1952673.1	211670.2	29.24822324	91.4820012	211.0	
M257	3/2	7/6/96 16:48:04.3 16:48:13.1	14.5D	8.8	1952468.5	211357.5	29.24736667	91.4826500	212.0	
M258	3/2	7/6/96 16:48:14.7- 16:48:19.1	27.5-	4.4	1952427.5	211286.0	29.24717979	91.4827968	214.2	
M259	3/2	7/6/96 16:49:26.5- 16:49:32.6	12.0D	6.1	1952002.2	210739.4	29.24569150	91.4841557	217.7	
M260	3/2	7/6/96 16:50:02.3- 16:50:08.3	30.0D	6.0	1951792.0	210473.2	29.24496761	91.4848271	219.4	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M261	3/2	7/6/96 16:50:17.6- 16:50:29.7	11.0M	12.1	1951881.4	210323.1	29.24457783	91.4852055	218.4	
M262	3/2	7/6/96 16:50:54.9- 16:51:02.6	28.5M	7.7	1951474.5	210084.1	29.24390880	91.4858386	221.7	
M263	3/2	7/6/96 16:51:25.1- 16:51:49.2	10.5M	24.1	1951229.0	209803.4	29.24311185	91.4865715	217.1	
M264	3/2	7/6/96 16:52:16.1- 16:52:23.8	16.5-	7.7	1951000.9	209501.0	29.24228666	91.4872967	215.3	
M265	3/2	7/6/96 16:52:53.4- 16:52:57.9	20.5-	4.5	1950796.7	209211.4	29.24148613	91.4879305	217.8	
M266	3/2	7/6/96 16:53:54.9- 16:54:02.6	17.5M	7.7	1950444.3	208736.5	29.24016165	91.4890050	214.3	
M267	3/2	7/6/96 16:54:23.4- 16:54:26.7	20.5+	3.3	1950318.3	208516.8	29.23963123	91.4895021	228.0	
M268	3/2	7/6/96 16:55:05.7- 16:55:11.7	14.0-	6.0	1950014.7	208248.3	29.23884277	91.4903906	219.4	
M269	3/2	7/6/96- 16:55:20.5- 16:55:23.8	30.5+	3.3	1949936.3	208149.3	29.23858132	91.4906520	221.5	
M270	3/2	7/6/96 16:55:35.3- 16:55:43.0	91.5D	7.7	1949832.1	208030.9	29.23825536	91.4909780	221.5	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M271	3/2	7/6/96 16:56:07.2- 16:56:18.8	20.0M	11.6	1949628.5	207775.5	29.23753900	91.4915962	219.0	B16
M272	3/2	7/6/96 16:56:32.5- 16:56:52.3	30.5M	19.8	1949450.3	207568.0	29.23693503	91.4920983	212.2	B16
M273	3/2	7/6/96 16:57:50.6- 16:57:59.4	13.0D	8.8	1949058.3	206994.8	29.23537673	91.4933600	216.4	
M274	3/2	7/6/96 16:58:16.3- 16:58:20.6	17.5+	4.3	1948945.3	206835.3	29.23494368	91.4937230	217.6	
M275	3/2	7/6/96 16:58:23.4- 16:58:37.1	69.0D	13.7	1948878.9	206749.9	29.23470475	91.4939246	216.8	
M276	3/2	7/6/96 16:59:40.2- 16:59:43.0	15.0+	2.8	1948478.3	206204.1	29.23320880	91.4951886	218.2	
M277	3/2	7/6/96 17:00:02.8- 17:00:14.3	38.0-	11.5	1948317.4	205991.7	29.23263831	91.4957133	220.9	
M278	3/2	7/6/96 17:00:19.3- 17:00:26.4	9.0+	7.1	1948232.1	205920.7	29.23241621	91.4959392	215.6	
M279	3/2	7/6/96 17:01:32.7- 17:01:37.1	7.0D	4.4	1947785.4	205378.3	29.23092415	91.4973395	215.9	
M280	3/2	7/6/96 17:01:43.1- 17:01:45.9	13.5-	2.8	1947742.3	205302.3	29.23073802	91.4975096	220.4	B15

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M281	3/2	7/6/96 17:03:41.7- 17:03:50.5	43.0M	8.8	1947043.1	204422.6	29.22831426	91.4996952	220.1	B12
M282	3/2	7/6/96 17:05:01.2- 17:05:12.9	86.0M	11.7	1946565.6	203800.3	29.22656042	91.5011208	211.6	
M283	3/2	7/6/96 17:06:09.9- 17:06:17.6	110.0+	7.7	1946212.5	203289.9	29.22517982	91.5022690	216.9	
M284	3/2	7/6/96 17:06:48.9- 17:07:01.0	9.5M	12.1	1945985.6	202971.2	29.22431380	91.5029964	219.2	
M285	3/2	7/6/96 17:07:02.8- 17:07:07.1	12.0-	4.3	1945921.5	202897.5	29.22410384	91.5031863	217.8	
M286	3/2	7/6/96 17:07:16.4- 17:07:23.5	15.5-	7.1	1945837.1	202783.1	29.22379968	91.5034670	217.0	
M287	3/2	7/6/96 17:08:01.3- 17:08:07.3	7.5D	6.0	1945561.3	202445.8	29.22290255	91.5043712	225.5	
M288	3/2	7/6/96 17:08:44.6- 17:08:50.7	5.0D	6.1	1945271.8	202164.5	29.22209667	91.5052367	220.0	
M289	3/3	7/6/96 17:52:32.9 17:52:48.3	6.0D	15.4	1956946.9	216868.5	29.26267884	91.4688045	236.7	B29
M290	3/3	7/6/96 17:53:04.8- 17:53:07.6	5.0+	2.8	1956749.4	216761.6	29.26226331	91.4692843	216.5	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M291	3/3	7/6/96 17:53:25.7- 17:53:34.6	15.0M	8.9	1956633.0	216607.6	29.26182752	91.4696283	214.0	
M292	3/3	7/6/96 17:53:51.0- 17:53:55.4	153.0+	4.4	1956508.4	216431.3	29.26131875	91.4699708	208.4	
M293	3/3	7/6/96 17:54:06.4- 17:54:15.1	9.5D	8.7	1956464.6	216295.2	29.26100417	91.4702125	221.3	
M294	3/3	7/6/96 17:54:22.8- 17:54:33.2	10.5M	10.4	1956354.7	216181.9	29.26068506	91.4705465	219.9	
M295	3/3	7/6/96 17:54:35.9- 17:54:42.0	6.5+	6.1	1956257.4	216120.2	29.26044355	91.4707078	202.9	
M296	3/3	7/6/96 17:55:34.6- 17:55:42.3	17.5D	7.7	1956001.5	215680.5	29.2593291	91.4716771	223.2	
M297	3/3	7/6/95 17:55:52.8- 17:56:06.0	16.0M	13.2	1955861.0	215567.2	29.25894401	91.4720060	209.3	
M298	3/3	7/6/96 17:56:09.3- 17:56:20.9	10.5M	11.6	1955806.0	215455.7	29.25865933	91.4722216	214.5	
M299	3/3	7/6/96 17:57:33.3- 17:57:40.4	16.6-	7.1	1955388.7	214881.5	29.25708366	91.4735330	215.5	
M300	3/3	7/6/96 17:59:09.3- 17:59:16.4	21.5D	7.1	1954872.1	214212.6	29.25525671	91.4751766	218.4	B27

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M301	3/3	7/6/96 18:00:51.2- 18:01:04.9	38.0D	13.7	1954321.9	213457.4	29.25315625	91.4768625	213.9	B26
M302	3/3	7/6/96 18:01:31.8- 18:01:38.9	11.5-	7.1	1954135.5	213190.4	29.25248184	91.4775348	225.5	
M303	3/3	7/6/96 18:02:16.8- 18:02:49.3	50.5M	32.5	1953817.9	212845.7	29.25150576	91.4784942	220.7	
M304	3/3	7/6/96 18:07:10.4- 18:07:18.1	21.5D	7.7	1952258.6	210835.0	29.24597942	91.4833873	222.2	
M305	3/3	7/6/96 18:08:25.4- 18:08:37.5	138.0M	12.1	1951818.4	210286.7	29.24444359	91.4847265	217.2	
M306	3/3	7/6/96 18:08:43.6- 18:08:46.9	11.0+	3.3	1951760.4	210199.4	29.24420625	91.4849125	217.8	
M307	3/3	7/6/96 18:09:15.3 18:09:22.5	31.5+	7.2	1951597.0	209950.7	29.24352997	91.4854367	215.6	B23
M308	3/3	7/6/96 18:09:36.2- 18:09:40.6	10.5-	4.4	1951475.2	209826.7	29.24314951	91.4857503	216.0	B23
M309	3/3	7/6/96 18:10:12.4- 18:10:19.6	7.0D	7.2	1951294.1	209547.2	29.24243395	91.4864051	222.1	
M310	3/3	7/6/96 18:11:06.4- 18:11:15.2	17.0+	8.8	1950971.4	209205.1	29.24147643	91.4873935	219.2	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M311	3/3	7/6/96 18:12:07.7- 18:12:18.1	20.5D	10.4	1950608.9	208755.4	29.24019635	91.4884536	213.3	
M312	3/3	7/6/96 18:12:21.5- 18:12:28.5	6.0+	7.0	1950560.0	208656.9	29.23996133	91.4886720	218.0	
M313	3/3	7/6/96 18:12:49.5- 18:12:52.8	56.5-	3.3	1950421.0	208476.3	29.23944049	91.4890667	213.1	
M314	3/3	7/6/96 18:13:15.3- 18:13:29.0	93.0M	13.7	1950293.7	208254.9	29.23886419	91.4895191	219.9	
M315	3/3	7/6/96 18:13:45.4- 18:13:48.1	8.5-	2.7	1950135.8	208069.1	29.238333346	91.4899832	216.0	B21, B22
M316	3/3	7/6/96 18:13:57.5- 18:14:04.6	27.5-	7.1	1950072.5	207969.3	29.23808932	91.4902273	222.0	B21, B22
M317	3/3	7/6/96 18:14:20.0- 18:14:28.7	101.0M	8.7	1949926.3	207800.5	29.23763999	91.4907050	224.7	
M318	3/3	7/6/96 18:15:03.3- 18:15:07.7	9.0+	4.4	1949663.4	207523.1	29.23684121	91.4914798	218.3	
M319	3/3	7/6/96 18:15:18.1- 18:15:25.8	24.0D	7.7	1949581.3	207411.7	29.23655352	91.4917643	221.9	
M320	3/3	7/6/96 18:15:27.5- 18:15:39.0	10.5M	11.5	1949495.8	207323.5	29.23628966	91.4920013	217.9	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M321	3/3	7/6/96 18:15:54.4- 18:15:57.2	6.0-	2.8	1949361.7	207184.3	29.23588398	91.4923827	213.1	
M322	3/3	7/6/96 18:16:09.3- 18:16:19.7	19.5M	10.4	1949271.2	207049.4	29.23551419	91.4926691	213.5	
M323	3/3	7/6/96 18:17:06.4- 18:17:12.5	19.5D	6.1	1948987.1	206637.3	29.23442357	91.4936264	222.2	B19
M324	3/3	7/6/96 18:17:46.6- 18:17:51.5	13.5+	4.9	1948754.7	206354.9	29.23359518	91.4942715	211.9	
M325	3/3	7/6/96 18:18:00.3 18:18:09.1	18.5M	8.8	1948689.1	206231.8	29.23328698	91.4945297	218.4	
M326	3/3	7/6/96 18:18:27.3- 18:18:33.3	77.0D	6.0	1948554.1	206056.0	29.23281680	91.4949721	221.0	
M327	3/3	7/6/96 18:18:41.0- 18:18:47.0	17.0-	6.0	1948462.1	205951.4	29.23251367	91.4952378	218.1	
M328	3/3	7/6/96 18:20:14.0- 18:20:21.2	112.5+	7.2	1947923.0	205274.3	29.23063646	91.4969036	215.4	
M329	3/3	7/6/96 18:20:47.0- 18:20:51.4	25.5D	4.4	1947761.4	205054.0	29.23007487	91.4974751	224.0	
M330	3/3	7/6/96 18:21:09.0- 18:21:20.0	97.5+	11.0	1947583.1	204884.9	29.22955885	91.4979578	214.3	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M331	3/3	7/6/96 18:21:53.0- 18:22:01.8	6.5M	8.8	1947361.6	204565.1	29.22868672	91.4986650	216.0	
M332	3/3	7/6/96 18:22:07.8- 18:22:13.8	17.5D	6.0	1947294.9	204465.8	29.22841823	91.4988818	217.0	
M333	3/3	7/6/96 18:22:57.1- 18:23:06.4	108.5+	9.3	1947002.4	204115.5	29.22746380	91.4998130	219.0	
M334	3/3	7/6/96 18:25:15.4- 18:25:22.5	39.0+	7.1	1946251.2	203074.8	29.22462845	91.5022033	220.9	
M335	3/3	7/6/96 18:25:45.0- 18:26:12.5	18.0M	27.5	1946005.1	202808.6	29.22391405	91.5029956	227.6	
M336	3/4	7/31/96 08:17:36.2- 08:17:44.9	32.0D	8.7	1945981.6	202519.9	29.22386533	91.5023513	36.4	
M337	3/4	7/31/96 08:25:13.8- 08:25:45.0	72.5M	31.2	1948606.7	205836.8	29.23299204	91.4941286	37.5	
M338	3/4	7/31/96 08:26:52.7- 08:26:58.8	13.0+	6.1	1949075.5	206421.3	29.23460267	91.4926640	37.2	
M339	3/4	7/31/96 08:27:37.7- 08:28:02.9	29.5M	19.4	1949381.1	206819.2	29.23571180	91.4917310	34.3	
M340	3/4	7/31/96 08:29:06.1- 08:29:20.9	262.5M	14.8	1945835.5	207428.8	29.23737798	91.4902887	36.8	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M341	3/4	7/31/96 08:29:49.5- 08:30:03.2	14.5M	13.7	1950030.9	207705.7	29.23815182	91.4896973	34.3	
M342	3/4	7/31/96 08:30:34.5- 08:30:43.8	71.0-	9.3	1950273.2	208037.1	29.23903807	91.4888968	39.6	
M343	3/4	7/31/96 08:30:52.6- 08:31:04.7	385.5+	12.1	1950387.7	208177.1	29.23943182	91.4885510	38.0	
M344	3/4	7/31/96 08:31:40.4- 08:31:51.4	103.0M	11.0	1950662.2	208505.8	29.24034535	91.4877047	36.3	
M345	3/4	7/31/96 08:32:30.3- 08:32:39.2	44.5-	8.9	1950917.6	208840.1	29.24125737	91.4868926	38.0	
M346	3/4	7/31/96 08:32:48.1- 08:32:58.6	182.0D	10.5	1951029.7	208975.4	29.24162783	91.4865388	38.3	
M347	3/4	7/31/96 08:33:30.2- 08:33:37.4	9.0D	7.2	1951264.8	109259.5	29.24242419	91.4858258	35.5	
M348	3/4	7/31/96 08:34:18.0- 08:34:22.9	11.0-	4.9	1951509.2	209581.3	29.24328900	91.4850277	39.7	
M349	3/4	7/31/96 08:34:33.3- 08:34:42.2	45.5D	8.9	1951614.2	209707.6	29.24363574	91.4846976	39.9	
M350	3/4	7/31/96 08:35:39.3- 08:36:01.8	78.5M	22.5	1952041.3	210253.9	29.24513952	91.4833605	39.9	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M351	3/4	7/31/96 08:38:21.4- 08:38:27.3	22.5D	5.9	1952853.4	211320.6	29.24808770	91.4808364	37.6	
M352	3/4	7/31/96 08:39:28.7- 08:39:37.5	36.0D	8.8	1953245.5	211792.2	29.24938415	91.4796050	37.9	
M353	3/4	7/31/96 08:42:21.0- 08:42:27.4	22.5-	6.4	1954170.8	213009.1	29.25274175	91.4767222	36.3	
M354	3/4	7/31/96 08:43:12.4- 08:43:25.6	17.5M	13.2	1954454.2	213402.5	29.25380101	91.4757990	40.9	
M355	3/4	7/31/96 08:45:06.1- 08:45:20.9	59.0+	14.8	1955112.3	214218.2	29.25605907	91.4737576	38.5	
M356	3/4	7/31/96 08:47:58.5- 08:48:18.2	17.0M	19.7	1956036.0	215399.2	29.25928968	91.4708488	42.3	
M357	3/4	7/31/96 08:50:25.6- 08:50:36.1	52.0D	10.5	1956843.9	216413.5	29.26210231	91.4683644	38.4	
M358	3/4	7/31/96 08:51:24.2- 08:51:30.2	45.5D	6.0	1957147.6	216819.7	29.26323431	91.4674078	35.6	B32
M359	3/4	7/31/96 08:51:48.4- 08:51:51.1	9.5-	2.7	1957268.7	216969.5	29.26365833	91.4670500	33.0	
M360	53/	7/31/96 10:24:17.3- 10:24:30.5	44.0D	13.2	1957286.1	216728.9	29.26220983	-91.4676519	223.1	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M361	3/5	7/31/96 10:25:17.2- 10:25:21.6	8.5D	4.4	1956951.3	216372.9	29.26120352	-91.4686632	218.2	
M362	3/5	7/31/96 10:25:29.3- 10:25:33.6	9.5-	4.3	1956874.6	216291.2	29.26095182	91.4688574	212.5	
M363	3/5	7/31/96 10:28:00.8- 10:28:15.6	208.0D	14.8	1956150.6	215182.7	29.25804837	91.4713016	237.9	
M364	3/5	7/31/96 10:28:33.7- 10:28:40.9	26.5D	7.2	1955966.3	215061.2	29.25761771	91.4717823	222.8	
M365	3/5	7/31/96 10:31:47.2- 10:31:57.6	10.5D	10.4	1954881.6	213718.7	29.25388187	91.4751176	215.0	
M366	3/5	7/31/96 10:32:36.4- 10:32:56.4	8.5M	20.0	1954590.5	213320.9	29.25278763	91.4760305	215.2	
M367	3/5	7/31/96 10:33:11.1- 10:33:18.8	7.5M	7.7	1954416.3	213127.5	29.25222786	91.4765221	208.8	
M368	3/5	7/31/96 10:33:56.1- 10:34:00.5	8.0-	4.4	1954201.3	212807.5	29.25135482	91.4772118	210.7	
M369	3/5	7/31/96 10:34:36.8- 10:34:45.5	23.0D	8.7	1953963.8	212496.2	29.25052643	91.4780069	217.0	
M370	3/5	7/31/96 10:36:23.1- 10:36:27.5	37.0-	4.4	1963365.9	211785.4	29.24856391	91.4798694	215.8	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M371	3/5	7/31/96 10:36:42.9- 10:36:48.9	42.0+	6.0	1953241.2	211657.6	29.24817682	91.4801898	207.5	
M372	3/5	7/31/96 10:39:33.9- 10:39:45.5	42.5D	11.6	1952328.2	210395.9	29.24476263	91.4831540	220.5	
M373	3/5	7/31/96 10:40:11.4- 10:40:22.9	106.5D	11.5	1952133.1	210160.9	29.24413516	91.4837908	224.0	
M374	3/5	7/31/96 10:41:29.4- 10:41:43.8	12.0+	14.4	1951727.9	209591.9	29.25252725	91.4849985	216.1	
M375	3/5	7/31/96 10:41:50.4- 10:42:09.5	104.0M	19.1	1951576.1	209403.1	29.24200215	91.4854645	215.0	
M376	3/5	7/31/96 10:43:26.3- 10:43:33.9	29.0+	7.6	1951088.1	208752.7	29.24027116	91.4870766	226.1	
M377	3/5	7/31/96 10:44:36.6- 10:45:00.8	110.5M	24.2	1950614.3	208264.6	29.23886723	91.4884742	214.8	
M378	3/5	7/31/96 10:45:24.9- 10:45:36.5	40.5+	11.6	1950393.9	207920.0	29.23796569	91.4892337	223.9	
M379	3/5	7/31/96 10:46:35.1- 10:46:48.8	74.5M	13.7	1949998.3	207374.2	29.23643737	91.4904362	219.1	
M380	3/5	7/31/96 10:49:04.0- 10:49:38.0	60.0M	34	1949128.6	206336.7	29.23354810	91.4931019	212.2	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M381	3/5	7/31/96 10:50:14.2- 10:50:32.3	33.5M	18.1	1948758.2	205823.8	29.23216146	91.4943052	217.6	
M382	3/5	7/31/96 10:50:47.1- 10:50:53.1	16.5-	6.0	1948611.5	205643.8	29.23164840	91.4947349	214.0	
M383	3/5	7/31/96 10:51:30.9- 10:51:33.7	10.5-	2.8	1948389.0	205344.1	29.23083174	91.4954455	215.7	
M384	3/5	7/31/96 10:51:57.8- 10:52:09.8	20.5D	12.0	1948221.7	205107.9	29.23019403	91.4959893	218.3	
M385	3/5	7/31/96 10:55:29.5- 10:55:48.6	16.5M	19.1	1947017.5	203620.5	29.22609629	91.4997537	217.8	
M386	3/5	7/31/96 10:58:39.6- 10:58:50.1	9.5-	10.5	1946001.6	202231.0	29.22231068	91.5029863	225.0	
M387	3/6	7/6/96 16:02:25.9- 16:02:44.0	882.5D	18.1	1948240.5	204906.7	29.23041042	91.4952396	39.5	
M388	3/6	7/6/96 16:04:48.5- 16:05:51.8	47.5M	63.3	1949006.1	205862.7	29.23304819	91.4928518	33.4	
M389	3/6	7/6/96 16:06:23.1- 16:06:48.8	214.0M	25.7	1949541.7	206604.9	29.23510458	91.4911954	38.1	
M390	3/6	7/6/96 16:07:35.4- 16:07:42.5	121.5+	7.1	1949883.6	207036.4	29.23624167	91.4900583	47.3	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M391	3/6	7/6/96 16:10:53.3- 16:10:56.0	15.5+	2.7	1950943.2	208402.1	29.24001198	91.4867547	43.2	
M392	3/6	7/6/96 16:12:11.2- 16:12:17.2	152.5D	6.0	1951435.2	208921.1	29.24148105	91.4852689	38.1	
M393	3/6	7/6/96 16:12:32.1- 16:12:36.5	33.0+	4.4	1951548.0	209063.6	29.24188389	91.4849328	36.0	
M394	3/6	7/6/96 16:13:09.0- 16:13:18.6	151.5D	9.6	1951770.6	209346.4	29.24265537	91.4842242	37.5	
M395	3/6	7/6/96 16:13:54.4- 16:14:14.0	110.0M	19.6	1952067.8	209724.9	29.24371683	91.4833277	33.3	
M396	3/6	7/6/96 16:14:27.7- 16:14:40.9	72.5D	13.2	1952188.1	209919.6	29.24425137	91.4829486	33.6	
M397	3/6	7/6/96 16:15:23.2- 16:15:39.6	64.0M	16.1	1952452.8	210346.8	29.2437513	91.4820415	43.7	
M398	3/6	7/6/96 16:16:43.9- 16:16:49.9	9.0M	6.0	1952917.3	210889.8	29.24690162	91.4806317	37.9	
M399	3/6	7/6/96 16:21:35.1- 16:21:38.3	8.5-	3.2	1954513.3	212926.2	29.25251634	91.4756503	36.0	
M400	3/6	7/6/96 16:24:44.4- 16:25:02.0	79.5D	17.6	1955606.6	214336.7	29.25636872	91.4721820	40.2	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M401	3/6	7/6/96 16:25:27.7- 16:25:33.8	43.5D	6.1	1955824.5	214600.2	29.25710934	91.4715215	39.0	
M402	3/6	7/6/96 16:28:06.6- 16:28:16.0	5.5M	9.4	1956726.8	215753.9	29.26030404	91.4687273	35.1	
M403	3/6	7/6/96 16:28:56.1- 16:29:45.5	16.5M	49.4	1957104.6	216258.7	29.26167257	91.4675108	39.4	
M404	3/7	7/6/96 17:17:21.2- 17:17:30.0	80.0+	8.8	1947357.5	203504.1	29.22657741	91.4980428	36.4	
M405	3/7	7/6/96 17:19:43.4- 17:19:51.1	10.0+	7.7	1948177.7	204587.0	29.22953112	91.4954355	41.7	
M406	3/7	7/6/96 17:20:10.3- 17:20:36.0	7.5M	25.7	1948355.0	204768.2	29.23002565	91.4948743	40.8	
M407	3/7	7/6/96 17:20:58.5- 17:21:11.7	9.0D	13.2	1948683.7	205144.7	29.23108594	91.4938794	38.1	
M408	3/7	7/6/96 17:21:55.7- 17:22:04.5	99.5D	8.8	1949005.6	205551.2	29.23220097	91.4928657	38.9	A145
M409	3/7	7/6/96 17:22:33.0- 17:23:05.9	92.5M	32.5	1949301.4	205999.7	29.23343158	91.4919345	33.1	
M410	3/7	7/6/96 17:25:15.1- 17:25:25.4	60.0+	10.3	1950177.7	207051.0	29.23633770	91.4892101	37.0	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M411	37	7/6/96 17:26:16.4- 17:26:24.1	5.5M	7.7	1950543.0	207500.6	29.23757861	91.4880714	36.7	
M412	37	7/6/96 17:28:03.4- 17:29:07.4	60.0M	64.0	1951343.6	208573.0	29.24054098	91.4855838	34.5	
M413	37	7/6/96 17:29:47.9- 17:29:52.3	27.0D	4.4	1951760.6	209157.8	29.24213880	91.4842585	37.0	
M414	37	7/6/96 17:31:21.1- 17:31:26.9	69.0+	24.8	1952330.3	209882.2	29.24412334	91.4824600	38.9	
M415	37	7/6/96 17:31:36.3- 17:31:43.4	378.0D	7.1	1952425.1	209991.3	29.24442956	91.4821723	37.8	
M416	37	7/6/96 17:32:03.2- 17:32:07.6	63.0+	4.4	1952587.1	210195.4	29.24499518	91.4816715	37.0	
M417	37	7/6/96 17:33:27.2- 17:34:12.0	25.5M	44.8	1953214.0	211003.8	29.24721559	91.4797007	39.6	
M418	37	7/6/96 17:34:40.5- 17:34:49.4	29.0M	8.9	1953547.5	211417.6	29.24835661	91.4786601	37.6	
M419	37	7/6/96 17:36:28.4- 17:36:32.8	30.0+	4.4	1954196.8	212246.4	29.25064490	91.4766384	36.2	B38
M420	37	7/6/96 17:37:27.2- 17:37:34.9	9.0D	6.7	1954556.4	212722.7	29.25195576	91.4755128	36.7	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M421	3/7	7/6/96 17:38:46.7- 17:39:09.3	18.5M	22.6	1955069.6	213416.8	29.25385771	91.4738923	38.0	
M422	3/7	7/6/96 17:39:34.6- 17:39:46.6	161.5D	12.0	1955337.5	213749.0	29.25476562	91.4730432	39.3	
M423	3/7	7/6/96 17:40:28.8- 17:40:39.3	15.5-	10.5	1955671.9	214163.8	29.25590592	91.4719941	39.6	
M424	3/7	7/6/96 17:44:39.2- 17:44:56.8	9.5M	17.6	1957188.4	216158.4	29.26139902	91.4672507	38.0	
M425	3/7	7/6/96 17:44:12.1- 17:46:16.4	7.0D	4.3	1957774.4	216807.9	29.26322279	91.4654772	31.4	
M426	3/8	7/31/96 09:02:22.8- 09:02:30.0	10.0+	7.3	1957784.0	216568.0	29.26179027	91.4661159	226.8	
M427	3/8	7/31/96 09:03:16.8- 09:03:21.2	13.0+	4.4	1957542.5	216276.5	29.26096774	91.4668479	223.4	
M428	3/8	7/31/96 09:05:06.5- 09:05:15.3	28.5-	6.5	1957047.1	216534.4	29.25917970	91.4683703	219.5	
M429	3/8	7/31/96 09:05:21.4- 09:05:28.5	6.0D	7.1	1956963.2	215543.4	29.25894877	91.4686602	223.1	
M430	3/8	7/31/96 09:07:10.6- 09:07:15.5	93.5D	4.9	1956294.1	214852.4	29.25710592	91.4708215	232.8	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M431	3/8	7/31/96 09:08:47.8- 09:08:54.1	22.0+	6.3	1955894.0	214186.9	29.25536963	91.4721423	246.1	
M432	3/8	7/31/96 09:10:54.3- 09:11:01.9	6.0D	7.6	1955189.2	213464.2	29.25310346	91.4738661	183.8	
M433	3/8	7/31/96 09:12:50.0- 09:12:52.8	8.0+	2.8	1954676.7	212685.1	29.25104063	91.4757594	215.4	
M434	3/8	7/31/96 09:13:42.2- 09:13:57.5	11.5M	10.3	1954348.1	212213.4	29.24975618	91.4768105	218.2	
M435	3/8	7/31/96 09:16:40.9- 09:17:01.8	13.5+	20.9	1953383.0	210972.1	29.24634326	91.4798378	219	
M436	3/8	7/31/96 09:18:03.2- 09:19:46.9	16.0M	103.7	1952636.2	210040.0	29.24378867	91.4821920	221.2	
M437	3/8	7/31/96 09:23:40.9- 09:23:45.3	14.5-	4.4	1951088.0	208013.0	29.23820000	91.4870250	219.5	
M438	3/8	7/31/96 09:26:02.1- 09:26:10.9	24.0+	8.8	1950281.0	207028.0	29.23546221	91.4892085	214.2	
M439	3/8	7/31/96 09:28:15.3- 09:28:24.6	87.5+	9.3	1949562.7	206062.3	29.23281891	91.4917818	217.3	
M440	3/8	7/31/96 09:28:41.1- 09:28:47.1	12.0D	6.0	1949426.6	205886.1	29.23233079	91.4922025	216.7	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M441	3/8	7/31/96 09:30:13.9- 09:30:45.6	12.0M	31.7	1948844.1	205126.2	29.23027370	91.4940763	223.3	
M442	3/8	7/31/96 09:33:58.7- 09:34:14.0	8.5M	15.3	1947627.7	203608.3	29.22604701	91.4978098	214.0	
M443	3/8	7/31/96 09:35:54.5- 09:36:30.2	108.0M	35.7	1947025.5	202796.9	29.22385932	91.4997647	223.0	
M444	3/9	7/31/96 11:06:38.1- 11:08:11.3	25.0M	93.2	1947290.7	202904.6	29.22491536	91.4982286	39.1	
M445	3/9	7/31/96 11:13:14.5- 11:13:30.9	15.0M	16.4	1949302.8	205451.0	29.23192598	91.4919327	39.0	
M446	3/9	7/31/96 11:14:20.3- 11:14:35.2	55.5-	14.9	1949665.5	205956.6	29.23331019	91.4907866	40.5	
M447	3/9	7/31/96 11:15:14.1- 11:15:59.1	55.5M	44.7	1950040.7	206431.8	29.23463008	91.4896299	38.2	
M448	3/9	7/31/96 11:16:41.4- 11:16:51.8	411.5D	10.4	1950430.3	206928.4	29.23596615	91.4883672	43.9	
M449	3/9	7/31/96 11:16:59.5- 11:17:06.6	75.5-	7.1	1950516.1	207021.5	29.23624587	91.4881305	39.7	
M450	3/9	7/31/96 11:17:34.1- 11:17:46.1	38.5-	12.0	1950755.0	207276.2	29.23698577	91.4874484	31.5	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M451	3/9	7/31/96 11:18:02.6- 11:18:11.3	69.0D	8.7	1950862.3	207489.0	29.23751322	91.4870201	43.3	
M452	3/9	7/31/96 11:21:12.9- 11:21:23.3	29.0+	10.4	1951970.3	208846.7	29.24129030	91.4836097	35.7	
M453	3/9	7/31/96 11:25:09.9- 11:25:18.7	114.5+	8.8	1953242.5	210524.4	29.24588344	91.4795888	40.7	
M454	3/9	7/31/96 11:30:01.1- 11:30:20.3	16.0M	19.2	1954866.3	212611.5	29.25164281	91.4745270	37.9	
M455	3/9	7/31/96 11:32:27.7- 11:32:35.3	20.0-	7.6	1955649.4	213581.5	29.25434635	91.4721352	30.6	
M456	3/9	7/31/96 11:34:08.6- 11:34:11.4	22.5+	2.8	1956161.0	214299.2	29.25627038	91.4704475	41.3	
M457	3/9	7/31/96 11:35:57.7- 11:36:09.9	10.5+	12.2	1956801.9	215097.5	29.25846419	91.4684358	42.0	
M458	3/10	7/31/96 12:24:39.1- 12:25:01.1	29.5D	22.0	1946539.1	201678.5	29.22157932	91.5006471	30.8	
M459	3/10	7/31/96 12:26:52.1- 12:27:07.2	163.0-	15.1	1947233.6	202568.8	29.22398982	91.4984034	39.4	
M460	3/10	7/31/96 12:27:19.2- 12:27:31.4	23.5-	12.2	1947385.5	202748.6	29.22448854	91.4979339	38.7	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M461	3/10	7/31/96 12:27:54.9- 12:28:17.9	16.5+	23.0	1947619.1	203056.7	29.22531699	91.4971745	42.4	
M462	3/10	7/31/96 12:30:08.9- 12:30:11.6	8.0+	2.7	1948341.2	203941.7	29.22776667	91.4949333	40.0	
M463	3/10	7/31/96 12:30:50.6 12:31:08.7	8.5M	18.1	1948638.9	204310.3	29.22879157	91.4940167	38.0	
M464	3/10	7/31/96 12:31:34.0- 12:31:40.0	16.5+	6.0	1948821.8	204582.5	29.22957044	91.4934962	31.7	
M465	3/10	7/31/96 12:32:02.6- 12:32:16.2	14.0D	13.6	1949016.6	204828.9	29.23025355	91.4928964	30.5	
M466	3/10	7/31/96 12:33:02.8- 12:33:13.3	13.5M	10.5	1949296.2	205280.8	29.23141410	91.4918955	46.8	
M467	3/10	7/31/96 12:33:47.8- 12:33:56.6	13.5M	8.8	1949595.5	205550.6	29.23222018	91.4910465	35.1	
M468	3/10	7/31/96 12:34:44.8- 12:35:49.8	53.5M	65.0	1950108.5	206249.1	29.23413447	91.4894270	36.9	B43
M469	3/10	7/31/96 12:36:44.9- 12:36:56.7	132.0D	11.8	1950601.7	206900.3	29.23591654	91.4878669	39.0	
M470	3/10	7/31/96 12:37:58.5- 12:38:20.5	162.0D	22.0	1951063.3	207454.1	29.23743810	91.4864173	39.6	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M471	3/10	7/31/96 12:38:26.6- 12:38:31.4	15.5-	4.8	1951170.1	207611.1	29.23786187	91.4860715	41.1	
M472	3/10	7/31/96 12:39:01.1- 12:39:24.0	35.5D	22.9	1951443.8	207901.1	29.23867390	91.4852341	38.6	
M473	3/10	7/31/96 12:39:37.1- 12:39:43.3	7.5D	6.2	1951694.2	208065.4	29.23922249	91.4847411	33.3	
M474	3/10	7/31/96 12:41:23.7- 12:41:32.5	14.0D	8.8	1952162.2	208915.6	29.24148441	91.4830156	34.9	
M475	3/10	7/31/96 12:42:13.1- 12:42:31.2	67.0M	18.1	1952492.3	209346.9	29.24263733	91.4819293	41.6	
M476	3/10	7/31/96 12:45:31.4- 12:45:41.9	16.5-	10.5	1953608.3	210674.3	29.24630571	91.4784555	39.0	
M477	3/10	7/31/96 12:45:49.0- 12:45:56.7	266.0-	7.7	1953698.7	210784.1	29.24660245	91.4781642	40.1	
M478	3/10	7/31/96 12:46:50.5- 12:47:04.2	9.0D	13.7	1954054.8	211264.3	29.24793451	91.4770655	38.0	
M479	3/10	7/31/96 12:50:19.4- 12:50:28.2	326.5D	8.8	1955191.0	212766.3	29.25204398	91.4734727	42.7	
M480	3/10	7/31/96 12:50:34.2- 12:50:41.9	11.5D	7.7	1955264.1	212874.8	29.25233969	91.4732405	43.2	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M481	3/10	7/31/96 12:51:43.5- 12:51:50.6	34.5D	7.1	1955695.7	213358.3	29.25369464	91.4719220	38.8	
M482	3/10	7/31/96 12:53:23.9- 12:53:34.4	21.0-	10.5	1956248.3	214121.0	29.25584568	91.4702898	27.1	
M483	3/10	7/31/96 12:56:01.3- 12:56:05.7	18.0D	4.4	1957082.1	215226.1	29.25881398	91.4675513	42.8	
M484	3/11	7/31/96 13:09:40.2- 13:09:52.3	10.5D	12.1	1957490.7	215555.9	29.25894183	91.4669415	214.8	
M485	3/11	7/31/96 13:10:59.7- 13:11:04.6	35.0+	4.9	1957097.1	214943.9	29.25730542	91.4682446	224.0	
M486	3/11	7/31/96 13:13:07.5- 13:13:14.6	15.0D	7.1	1956320.1	213999.7	29.25467969	91.4706406	219.1	
M487	3/11	7/31/96 13:14:28.3- 13:14:31.6	12.0+	3.3	1955908.5	213417.9	29.25307657	91.4719267	218.8	
M488	3/11	7/31/96 13:14:50.8- 13:14:54.1	7.5+	3.3	1955783.0	213246.2	29.25261475	91.4723352	220.8	
M489	3/11	7/31/96 13:16:53.7- 13:16:57.0	9.5+	3.3	1955060.5	212337.4	29.25010888	91.4745911	220.0	
M490	3/11	7/31/96 13:19:07.4- 13:19:13.5	20.5-	6.1	1954285.6	211343.6	29.24734499	91.4769717	214.3	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M491	3/11	7/31/96 13:20:37.4- 13:20:55.6	9.0-	18.2	1953706.0	210498.3	29.24528333	91.4787667	212.0	
M492	3/11	7/31/96 13:22:48.0- 13:22:52.4	6.0+	4.4	1953027.3	209745.2	29.24293730	91.4808960	212.6	
M493	3/11	7/31/96 13:23:49.5- 13:23:56.7	5.0M	7.2	1952693.5	209276.3	29.24171896	91.4820477	226.4	
M494	3/11	7/31/96 13:24:23.7- 13:24:29.7	6.0+	6.0	1952494.5	209055.0	29.24108473	91.4826396	222.1	
M495	3/11	7/31/96 13:24:50.5- 13:24:58.3	38.5-	7.8	1952311.6	208848.6	29.24048779	91.4831693	216.6	
M496	3/11	7/31/96 13:26:22.4- 13:26:30.1	300.0+	7.7	1951832.0	208202.3	29.23871924	91.4846872	218.7	
M497	3/11	7/31/96 13:27:09.1- 13:27:43.6	23.5M	34.5	1951494.7	207758.9	29.23748237	91.4857173	215.5	
M498	3/11	7/31/96 13:27:56.8- 13:28:06.1	13.0D	9.3	1951309.4	207516.3	29.23679665	91.4862633	211.4	
M499	3/11	7/31/96 13:28:34.6- 13:28:43.4	14.5-	8.8	1951125.4	207231.0	29.23605684	91.4869147	220.8	
M500	3/11	7/31/96 13:29:22.3- 13:29:53.7	23.0M	31.4	1950788.2	206814.6	29.23493610	91.4880037	225.4	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M501	3/11	7/31/96 13:31:10.4- 13:31:20.9	68.5D	10.5	1950216.2	206157.9	29.23309206	91.4897456	218.9	
M502	3/11	7/31/96 13:32:25.6- 13:32:36.0	44.0D	10.4	1949814.0	205620.4	29.23158802	91.4909635	213.8	
M503	3/11	7/31/96 13:33:14.9- 13:33:29.8	16.0D	14.9	1949523.2	205217.0	29.23048554	91.4918874	215.5	
M504	3/11	7/31/96 13:34:25.3- 13:34:51.0	20.5M	25.7	1949124.4	204696.7	29.22907646	91.4431020	207.5	
M505	3/11	7/31/96 13:35:29.9- 13:35:43.6	23.5-	13.7	1948806.8	204260.0	29.22786490	91.4941518	218.3	
M506	3/11	7/31/96 13:36:55.4- 13:37:01.5	7.0+	6.1	1948322.4	203698.2	29.22633758	91.4956958	222.0	
M507	3/11	7/31/96 13:37:58.6- 13:38:04.3	10.5+	5.7	1947974.4	203271.6	29.22513690	91.4967464	217.0	
M508	3/11	7/31/96 13:41:02.9- 13:41:08.9	16.0+	6.0	1946953.1	201947.3	29.22145809	91.4998807	209.6	
M509	3/11	7/31/96 13:42:36.1- 13:42:42.2	7.5+	6.1	1946480.2	201310.5	29.21976552	91.5014619	222.3	
M510	3/12	7/31/96 09:43:33.6- 09:43:46.8	51.0D	13.2	1946895.7	201573.8	29.22128560	91.4995144	32.5	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M511	3/12	7/31/96 09:45:53.1- 09:46:07.9	34.5M	14.8	1947629.7	202585.8	29.22402435	91.4971423	42.0	
M512	3/12	7/31/96 09:47:08.1- 09:47:21.2	55.5D	13.1	1948045.1	203103.3	29.22547021	91.4958733	38.0	
M513	3/12	7/31/96 09:49:21.2- 09:49:27.3	318.0-	6.1	1948788.5	204055.5	29.22807734	91.4935257	40.7	
M514	3/12	7/31/96 09:49:43.8- 09:49:51.5	53.0+	7.7	1948927.3	204233.7	29.22856400	91.4930860	41.4	
M515	3/12	7/31/96 09:50:21.6- 09:50:32.1	11.5M	10.5	1949171.3	204498.6	29.22933011	91.4923798	34.1	
M516	3/12	7/31/96 09:50:34.8- 09:50:50.1	250.0D	15.3	1949253.2	204614.3	29.22963926	91.4921072	36.1	
M517	3/12	7/31/96 09:52:39.3- 09:53:02.3	19.0M	23.0	1949963.0	205509.8	29.23208203	91.4898513	40.6	
M518	3/12	7/31/96 09:55:13.8- 09:56:16.9	45.0M	63.1	1951006.6	206809.9	29.23570749	91.4866638	30.8	
M519	3/12	7/31/96 09:58:41.2- 09:58:51.6	344.5D	10.4	1952022.9	208155.4	29.23939085	91.4834450	35.4	
M520	3/12	7/31/96 09:59:44.3- 09:59:51.4	58.0D	7.1	1952348.7	208618.3	29.24064701	91.4823962	39.1	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M521	3/12	7/31/96 10:02:01.9- 10:02:26.1	26.0M	24.2	1953203.4	209667.5	29.24352852	91.4797107	40.4	
M522	3/12	7/31/96 10:05:12.8- 10:05:33.6	341.0M	20.8	1954248.2	211051.6	29.24735299	91.4764622	37.5	
M523	3/12	7/31/96 10:07:01.9- 10:07:08.0	10.5+	6.1	1954854.4	211750.4	29.24926042	91.4745396	40.7	
M524	3/12	7/31/96 10:13:30.5- 10:13:36.5	28.5D	6.0	1957061.6	214582.7	29.25706901	91.4676477	38.3	
M525	3/13	7/31/96 11:45:42.7- 11:46:02.3	8.5M	19.6	1957855.1	215410.3	29.25853984	91.4657935	214.2	
M526	3/13	7/31/96 11:46:58.2- 11:47:21.8	8.5M	23.6	1957385.0	214846.1	29.25699805	91.4672846	216.6	
M527	3/13	7/31/96 11:48:19.0- 11:48:37.0	10.5M	18.0	1956990.9	214226.8	29.25528916	91.4685108	215.7	
M528	3/13	7/31/96 11:49:12.8- 11:49:20.4	7.0+	7.6	1956747.9	213851.4	29.25427770	91.4693056	220.0	
M529	3/13	7/31/96 11:49:50.6- 11:49:53.4	6.5+	2.8	1956538.9	213593.7	29.25366621	91.4700671	235.9	
M530	3/13	7/31/96 11:50:47.7- 11:50:55.1	15.5-	7.4	1956109.7	213252.7	29.25264762	91.4713294	223.3	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M531	3/13	7/31/96 11:54:11.3- 11:54:15.8	10.0D	4.5	1955003.0	211735.3	29.24845081	91.4747659	219.6	
M532	3/13	7/31/96 11:55:53.8- 11:56:05.4	51.5D	11.6	1954374.1	210970.2	29.24632801	91.4767091	214.7	
M533	3/13	7/31/96 11:58:17.7- 11:58:34.2	19.0M	16.5	1953529.5	209885.3	29.24338242	91.4794117	224.0	
M534	3/13	7/31/96 11:59:21.9- 11:59:38.4	391.5M	16.5	1953132.1	209408.4	29.2400768	91.4805590	211.7	
M535	3/13	7/31/96 12:00:35.4- 12:00:41.4	188.0+	6.0	1952790.9	208914.3	29.24065651	91.4816435	213.7	
M536	3/13	7/31/96 12:02:49.2- 12:03:01.2	446.0-	12.0	1952007.7	207926.3	29.23793154	91.4840851	212.5	
M537	3/13	7/31/96 12:04:04.2- 12:04:16.2	16.5D	12.0	1951583.9	207320.2	29.23632308	91.4855034	224.3	B45
M538	3/13	7/31/96 12:05:53.4- 12:06:01.2	25.5-	7.8	1950941.4	206568.5	29.23422177	91.4874705	218.5	
M539	3/13	7/31/96 12:06:25.3- 12:06:28.1	9.0+	2.8	1950781.8	206358.7	29.23364058	91.4879641	217.7	
M540	3/13	7/31/96 12:07:03.8- 12:07:12.9	18.5M	9.1	1950561.3	206063.5	29.23281578	91.4886342	215.2	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M541	3/13	7/31/96 12:09:48.9- 12:10:02.7	2938.0D	13.8	1949623.8	204830.4	29.22943160	91.4915851	217.3	
M542	3/13	7/31/96 12:11:52.1- 12:11:54.8	34.5+	2.7	1948930.6	204004.5	29.22715352	91.4937477	216.5	
M543	3/13	7/31/96 12:14:41.9- 12:14:48.9	10.5-	7.0	1947984.9	202733.2	29.22366250	91.4967208	218.3	
M544	3/14	7/31/96 14:39:27.0- 14:39:34.6	18.0D	7.6	1958245.9	215632.2	29.25919284	91.4646325	222.4	
M545	3/14	7/31/96 14:39:49.9- 14:39:54.3	8.5D	4.4	1958112.8	215510.1	29.25883362	91.4650165	218.1	
M546	3/14	7/31/96 14:42:25.8- 14:42:28.6	14.5+	2.8	1957287.1	214351.3	29.25563807	91.4675913	216.8	
M547	3/14	7/31/96 14:43:06.4- 14:43:13.5	17.0M	7.1	1957039.3	214019.9	29.25477787	91.4684388	226.3	
M548	3/14	7/31/96 14:46:42.6- 14:47:03.4	21.5D	20.8	1955754.3	212439.2	29.25036606	91.4723759	215.0	
M549	3/14	7/31/96 14:48:03.2- 14:48:10.9	43.5-	7.7	1955365.0	211888.3	29.24887965	91.4736413	220.9	
M550	3/14	7/31/96 14:49:33.3- 14:49:45.4	3057.0D	12.1	1954797.5	211268.8	29.24718919	91.4754387	223.6	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M551	3/14	7/31/96 14:50:12.3- 14:50:21.1	34.5D	8.8	1954570.0	210996.8	29.24639085	91.4760758	214.0	
M552	3/14	7/31/96 14:50:45.2- 14:50:54.6	30.0-	9.4	1954392.6	210749.2	29.24571892	91.4766477	216.0	
M553	3/14	7/31/96 14:52:53.0- 14:53:15.4	8.0M	22.4	1953852.7	209739.2	29.24294830	91.4789789	218.0	
M554	3/14	7/31/96 14:57:03.5- 14:57:10.7	11.0D	7.2	1952311.9	208057.6	29.23830501	91.4831522	215.0	
M555	3/14	7/31/96 15:00:57.4- 15:01:06.1	9.0D	8.7	1950980.6	206361.2	29.23364666	91.4873383	217.4	
M556	3/14	7/31/96 15:01:34.6- 15:01:40.6	26.0-	6.0	1950776.1	206125.4	29.23298757	91.4879624	215.4	
M557	3/14	7/31/96 15:02:28.8- 15:02:39.3	186.5D	10.5	1950500.0	205676.9	29.23177059	91.4888542	218.9	
M558	3/14	7/31/96 15:05:06.4- 15:05:18.4	14.0+	12.0	1949583.2	204575.1	29.22874317	91.4917323	220.1	
M559	3/14	7/31/96 15:06:06.3- 15:06:15.5	21.0+	9.2	1949274.2	204154.3	29.22755880	91.4926579	214.8	
M560	3/14	7/31/96 15:06:56.1- 15:07:00.5	30.5+	4.4	1949035.1	203800.6	29.22658859	91.4934114	215.5	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M561	3/14	7/31/96 15:08:33.5- 15:09:13.7	111.0M	40.2	1948441.4	203016.5	29.22447063	91.4953294	223.3	
M562	3/14	7/31/96 15:10:27.2- 15:10:41.0	14.5D	13.8	1947830.4	202312.3	29.22252171	91.4972283	221.5	
M563	3/14	7/31/96 15:11:57.3- 15:13:02.1	17.5M	64.8	1947232.0	201525.0	29.22034464	91.4990869	219.7	
M564	3/15	7/31/96 15:56:11.0- 15:56:20.4	65.5-	9.4	1958574.6	215701.9	29.25938366	91.4635997	222.0	
M565	3/15	7/31/96 15:57:41.2- 15:58:06.4	41.5M	25.2	1958056.3	215038.7	29.25749707	91.4651186	209.2	A147
M566	3/15	7/31/96 15:59:06.8- 15:59:12.3	5.0D	5.5	1957520.9	214484.0	29.25599898	91.4668510	215.8	
M567	3/15	7/31/96 16:00:15.4- 16:00:33.5	21.0D	18.1	1957073.1	213972.5	29.25460189	91.4682710	218.0	
M568	3/15	7/31/96 16:04:02.2- 16:04:17.0	32.5D	14.8	1955868.4	212340.6	29.25010911	91.4720409	217.8	
M569	3/15	7/31/96 16:05:14.1- 16:05:36.5	20.5M	22.4	1955414.5	211782.6	29.24857702	91.4734678	218.6	
M570	3/15	7/31/96 16:07:20.2- 16:07:33.9	148.0D	13.7	1954777.5	210819.2	29.24594456	91.4754888	222.2	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M571	3/15	7/31/96 16:08:15.8 16:08:24.4	25.5D	8.6	1954460.3	210462.7	29.24497061	91.4764918	223.5	
M572	3/15	7/31/96 16:08:44.1- 16:08:53.0	12.5-	8.9	1954273.4	210280.3	29.24444922	91.4770508	220.0	
M573	3/15	7/31/96 16:10:24.7- 16:11:41.1	10.5M	76.4	1953487.3	209264.3	29.24163877	91.4794908	217.3	
M574	3/15	7/31/96 16:12:17.1- 16:12:37.9	65.0M	20.8	1953019.6	208674.9	29.24000947	91.4809437	215.9	
M575	3/15	7/31/96 16:13:15.8- 16:13:38.3	14.5M	22.5	1952676.1	208241.3	29.23884167	91.4820583	221.0	
M576	3/15	7/31/96 16:16:26.2- 16:16:46.1	19.5M	19.9	1951627.5	206902.6	29.23514069	91.4853173	218.0	
M577	3/15	7/31/96 16:17:43.9- 16:17:58.9	16.5D	15.0	1951205.1	206382.4	29.23370700	91.4866366	217.6	
M578	3/15	7/31/96 16:21:48.9- 16:21:59.4	8.5+	10.5	1949822.7	204615.2	29.22884105	91.4909615	217.5	
M579	3/15	7/31/96 16:22:33.9- 16:22:59.1	19.5M	25.2	1949540.2	204253.0	29.22762337	91.4918100	213.1	
M580	3/15	7/31/96 16:24:02.3- 16:24:11.1	56.5D	8.8	1949118.7	203635.2	29.22614059	91.4931594	216.9	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M581	3/15	7/31/96 16:27:50.0- 16:28:05.4	10.5+	15.4	1947817.9	202020.6	29.22167406	91.4971926	212.3	
M582	3/15	7/31/96 16:30:27.6- 16:30:42.5	52.0-	14.9	1946947.3	200871.9	29.21857285	91.5000105	224.3	
M583	3/16	7/31/96 13:50:12.0- 13:50:46.7	21.0M	34.7	1947964.7	202034.0	29.22250186	91.4960815	43.1	
M584	3/16	7/31/96 13:52:04.6- 13:52:33.0	47.0M	28.4	1948569.3	202699.4	29.22436033	91.4942264	38.2	
M585	3/16	7/31/96 13:53:31.7- 13:53:38.8	8.5-	7.1	1949002.5	203219.2	29.22580237	91.4928881	36.0	
M586	3/16	7/31/96 13:55:00.1- 13:55:07.7	11.0+	7.6	1949486.4	203863.8	29.22757077	91.4913639	37.2	
M587	3/16	7/31/96 13:57:48.0- 13:58:08.9	22.0M	20.9	1950556.1	205254.3	29.23138609	91.4879972	39.7	
M588	3/16	7/31/96 14:00:58.6- 14:01:04.6	158.5-	6.0	1951576.9	206579.9	29.23504851	91.4848232	37.1	
M589	3/16	7/31/96 14:01:23.8- 14:01:28.7	9.0+	4.9	1951717.1	206782.9	29.23559343	91.4843633	39.8	
M590	3/16	7/31/96 14:02:37.8- 14:02:55.3	53.0M	17.5	1952173.5	207356.9	29.23717024	91.4829298	40.4	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M591	3/16	7/31/96 14:04:32.9- 14:04:40.6	15.5-	7.7	1952872.5	208182.2	29.23944216	91.4807412	40.5	
M592	3/16	7/31/96 14:05:18.0- 14:05:26.9	13.0D	8.9	1953143.7	208527.5	29.24041099	91.4799204	36.9	
M593	3/16	7/31/96 14:07:49.4- 14:08:01.5	35.0D	12.1	1954012.6	209713.7	29.24366019	91.4771765	40.0	
M594	3/16	7/31/96 14:09:21.0- 14:09:27.1	7.0-	6.1	1954526.6	210358.0	29.24542635	91.4755570	41.4	
M595	3/16	7/31/96 14:13:18.4- 14:13:33.1	10.0-	14.7	1955943.9	212181.7	29.25047298	91.4711604	36.2	
M596	3/16	7/31/96 14:18:42.3- 14:18:49.4	26.5-	7.1	1957836.6	214564.7	29.25702604	91.4652240	37.5	
M597	3/17	7/31/96 15:16:18.5- 15:21:29.0	772.5M	190.5	1947145.3	200620.8	29.21866106	91.4987185	33.6	
M598	3/17	7/31/96 15:22:32.1- 15:22:36.6	17.5+	4.5	1949311.6	203386.0	29.22624323	91.4918901	39.8	
M599	3/17	7/31/96 15:23:20.0- 15:23:26.0	60.5-	6.0	1949590.9	203747.7	29.22725661	91.4910434	36.3	
M600	3/17	7/31/96 15:27:27.6- 15:27:33.7	24.0-	6.1	1951068.2	205601.9	29.23236799	91.4864320	34.8	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M601	3/17	7/31/96 15:29:33.4- 15:29:41.0	31.0-	7.6	1951774.0	206577.6	29.23504750	91.4842128	36.1	
M602	3/17	7/31/96 15:32:29.2- 15:32:35.3	14.0D	6.1	1952852.6	207847.2	29.23856369	91.4808742	31.5	
M603	3/17	7/31/96 15:33:02.1- 15:33:09.3	36.0-	7.2	1953006.4	208117.2	29.23928774	91.4803582	35.8	
M604	3/17	7/31/96 15:33:27.4- 15:34:32.2	29.0M	64.8	1953311.9	208597.2	29.24057290	91.4793490	42.7	
M605	3/17	7/31/96 15:37:20.1- 15:37:47.1	19.0M	27.0	1954559.2	210084.5	29.24471243	91.4755139	33.7	
M606	3/17	7/31/96 15:46:51.3- 15:46:56.2	16.0D	4.9	1957778.6	214289.2	29.25627064	91.4654085	37.0	

**INVENTORY OF MAGNETIC ANOMALIES AT ATCHAFALAYA ODMDS
SURVEY BLOCK 4**

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M607	4/1	7/4/96 13:52:20.4- 13:52:23.8	11.0+	3.4	1969226.5	233021.7	29.30727753	91.4304174	255.4	
M608	4/1	7/4/96 13:53:43.2- 13:54:04.1	77.0M	20.9	1968579.4	232603.8	29.30585024	91.4322075	213.9	
M609	4/1	7/4/96 13:54:17.7- 13:54:20.4	92.5+	2.7	1968406.6	232441.2	29.30534990	91.4326174	199.0	
M610	4/1	7/4/96 13:55:52.1- 13:55:56.5	364.0+	4.4	1967998.8	231734.8	29.30352030	91.4341162	225.6	
M611	4/1	7/4/96 13:56:10.2- 13:56:14.5	12.5+	4.3	1967894.4	231625.7	29.30316944	91.4344036	216.2	
M612	4/1	7/4/96 13:57:26.5- 13:57:29.0	34.5-	3.3	1967487.6	231094.4	29.30168994	91.4356156	212.4	A149
M613	4/1	7/4/96 13:57:47.9- 13:57:50.6	21.5+	2.7	1967387.1	230943.6	29.30128438	91.4359478	214.4	A149
M614	4/1	7/4/96 13:58:13.2- 13:58:20.9	13.0M	7.7	1967242.0	230742.2	29.30072987	91.4364020	214.4	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M615	4/1	7/4/96 13:58:37.5- 13:58:47.9	20.0M	10.4	1967107.1	230561.8	29.30022733	91.4368137	213.1	
M616	4/1	7/4/96 13:58:50.6- 13:58:54.9	23.0D	4.3	1967062.0	230500.6	29.30005785	91.4369526	212.8	
M617	4/1	7/4/96 13:59:14.7- 13:59:17.5	8.5-	2.8	1966945.1	230320.5	29.29959464	91.4373577	217.5	
M618	4/1	7/4/96 13:59:19.1- 13:59:26.8	27.5M	7.7	1966906.2	230272.7	29.29944652	91.4374690	216.2	
M619	4/1	7/4/96 13:59:32.8- 13:59:35.6	5.5+	2.8	1966847.6	230190.8	29.29922476	91.4376586	217.0	
M620	4/1	7/4/96 13:59:41.6- 13:59:50.9	29.0M	9.3	1966767.6	230101.3	29.29896423	91.4378850	214.0	
M621	4/1	7/4/96 13:59:53.5- 14:00:01.2	29.M	7.7	1966713.6	230032.8	29.29876006	91.4380233	210.3	
M622	4/1	7/4/96 14:00:17.7- 14:00:25.4	218.0D	7.7	1966593.5	229858.9	29.29826676	91.4383666	206.5	
M623	4/1	7/4/96 14:00:37.5- 14:00:41.9	10.5+	4.4	1966522.0	229704.9	29.29787221	91.4386519	213.7	
M624	4/1	7/4/96 14:01:32.9- 14:01:40.0	5.0D	7.1	1966236.3	229266.0	29.29670635	91.4396124	222.0	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M625	4/1	7/4/96 14:01:41.6- 14:01:46.0	6.5-	4.4	1966191.0	229208.2	29.29655904	91.4397698	224.1	
M626	4/1	7/4/96 14:01:53.7- 14:01:56.4	11.0-	2.7	1966113.3	229152.2	29.29636911	91.4399630	217.4	
M627	4/1	7/4/96 14:02:01.4- 14:02:04.1	8.0-	2.7	1966072.2	229100.7	29.29623290	91.4401004	218.5	
M628	4/1	7/4/96 14:02:22.3- 14:02:29.2	9.5-	6.9	1965951.3	228948.4	29.29581003	91.4404733	217.8	
M629	4/1	7/4/96 14:02:58.5- 14:03:05.6	6.0-	7.1	1965738.5	228667.5	29.29502672	91.4411233	215.7	
M630	4/1	7/4/96 14:03:52.2- 14:03:56.6	7.0-	4.4	1965454.8	228282.7	29.29397547	91.4420245	217.3	
M631	4/1	7/4/96 14:04:23.6- 14:04:26.9	8.0+	3.3	1965287.7	228065.0	29.29337421	91.4425450	216.8	
M632	4/1	7/4/96 14:04:32.9- 14:04:37.8	5.5-	4.9	1965236.8	227993.2	29.29317676	91.4427044	216.9	
M633	4/1	7/4/96 14:04:43.4- 14:04:49.4	13.5D	6.0	1965189.8	227915.0	29.29296722	91.4428607	218.0	
M634	4/1	7/4/96 14:04:53.8- 14:04:58.2	74.5-	4.4	1965119.5	227841.3	29.29275627	91.4430680	216.4	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M635	4/1	7/4/96 14:05:04.2- 14:05:08.6	42.0-	4.4	1965064.1	227773.6	29.29255960	91.4432237	218.2	
M636	4/1	7/4/96 14:05:22.3- 14:05:25.1	25.5+	2.8	1964979.6	227633.7	29.29220521	91.4435372	220.3	
M637	4/1	7/4/96 14:05:35.5- 14:05:40.4	13.5D	4.9	1964902.2	227526.7	29.29192883	91.4438045	223.6	
M638	4/1	7/4/96 14:06:29.9- 14:06:34.3	14.5D	4.4	1964581.6	227162.9	29.29092218	91.4448019	222.7	
M639	4/1	7/4/96 14:06:35.9- 14:06:38.6	6.0-	2.7	1964548.5	227137.6	29.29084210	91.4448912	220.7	
M640	4/1	7/4/96 14:06:50.7- 14:06:58.4	7.0-	7.7	1964439.5	227026.0	29.29050825	91.4451917	215.5	
M641	4/1	7/4/96 14:07:01.1- 14:07:04.4	137.5+	3.3	1964396.5	226960.1	29.29033415	91.4453383	217.0	
M642	4/1	7/4/96 14:07:16.4- 14:07:22.5	47.0-	6.1	1964315.6	226841.6	29.29002244	91.4456138	219.8	
M643	4/1	7/4/96 14:07:29.5- 14:07:32.8	17.0-	3.3	1964243.2	226760.2	29.28978936	91.4458273	218.1	
M644	4/1	7/4/96 14:07:59.7- 14:08:04.1	163.5D	4.4	1964064.7	226523.6	29.28914176	91.4463916	218.7	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M645	4/1	7/4/96 14:08:17.9- 14:08:25.0	141.5M	7.1	1963958.9	226384.8	29.28874882	91.4467059	216.6	
M646	4/1	7/4/96 14:09:05.7- 14:10:07.1	26.0M	61.4	1963572.9	225858.8	29.28732120	91.4479455	220.5	
M647	4/1	7/4/96 14:10:14.8- 14:10:23.6	47.5-	8.8	1962847.0	224939.9	29.28477425	91.4501924	217.0	
M648	4/1	7/4/96 14:12:04.5- 14:12:19.3	621.5M	14.8	1962687.1	224719.6	29.28418333	91.4507167	220.0	
M649	4/1	7/4/96 14:13:22.4- 14:13:38.9	23.0M	16.5	1962253.0	224175.5	29.28266795	91.4520487	216.5	
M650	4/1	7/4/96 14:14:37.0- 14:15:07.2	15.0M	30.2	1961797.3	223574.3	29.28101984	91.4534868	217.8	
M651	4/1	7/4/96 14:15:41.7- 14:15:49.4	13.0D	7.7	1961492.9	223171.3	29.27992363	91.4544597	220.3	
M652	4/1	7/4/96 14:16:10.2- 14:16:16.3	16.0-	6.1	1961333.7	222984.4	29.27940244	91.4549484	219.0	
M653	4/1	7/4/96 14:16:30.0- 14:16:34.4	9.5-	4.4	1961234.2	222860.7	29.27906130	91.4552591	218.9	
M654	4/1	7/4/96 14:16:53.7- 14:16:59.7	54.0D	6.0	1961095.1	222689.5	29.27858958	91.4556937	218.8	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M655	4/1	7/4/96 14:17:09.0- 14:17:34.2	19.5M	25.2	1960933.4	222473.1	29.27800167	91.456217	220.2	
M656	4/1	7/4/96 14:18:12.0- 14:18:19.1	20.5+	7.1	1960632.6	222131.2	29.27704173	91.4571249	216.5	
M657	4/1	7/4/96 14:18:37.2- 14:19:10.2	30.5M	33.0	1960427.5	221878.4	29.27633486	91.4577485	214.2	
M658	4/1	7/4/96 14:20:34.1- 14:20:59.9	95.5M	25.8	1959846.1	221056.2	29.27407523	91.4595748	214.9	
M659	4/1	7/4/96 14:22:35.8- 14:22:41.8	16.0+	6.0	1959227.2	220267.3	29.27193721	91.4615647	221.5	
M660	4/1	7/4/96 14:22:55.5- 14:23:02.7	56.5-	7.2	1959109.7	220123.3	29.27154011	91.4619315	221.3	
M661	4/1	7/4/96 14:23:23.6- 14:23:29.6	7.5+	6.0	1958941.4	219940.1	29.27101409	91.4624263	217.1	
M662	4/1	7/4/96 14:24:46.3- 14:24:52.4	301.5D	6.1	1958493.7	219357.3	29.26939572	91.4638043	214.1	
M663	4/1	7/4/96 14:25:16.5- 14:25:23.7	71.5D	7.2	1958328.7	219131.3	29.26878810	91.4643452	217.1	
M664	4/1	7/4/96 14:27:39.0- 14:27:44.5	14.5+	5.5	1957557.2	218134.3	29.26604822	91.4667679	218.0	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M665	4/1	7/4/96 14:27:59.9- 14:28:52.1	38.0M	52.2	1957342.0	217840.6	29.26523161	91.4674289	216.4	
M666	4/2	8/1/96 08:42:16.5- 08:42:28.1	208.5D	11.6	1962379.1	224061.1	29.28237848	91.4516906	221.3	
M667	4/2	8/1/96 08:42:31.4- 08:42:41.8	41.0M	10.4	1962285.8	223956.0	29.28208018	91.4519698	219.6	
M668	4/2	8/1/96 08:42:58.3- 08:43:02.7	15.0D	4.4	1962141.0	223789.7	29.28161100	91.4524057	217.3	
M669	4/2	8/1/96 08:43:18.0- 08:43:20.7	19.0+	2.7	1962040.8	223640.1	29.28122549	91.4527578	222.3	
M670	4/2	8/1/96 08:43:35.6- 08:43:47.7	20.0M	12.1	1961903.6	223463.9	29.28073325	91.4531778	221.0	
M671	4/2	8/1/96 08:43:53.7- 08:44:02.6	183.5D	8.9	1961793.4	223349.4	29.28040433	91.4535027	218.4	
M672	4/2	8/1/96 08:44:11.9- 08:44:43.2	58.0M	31.3	1961648.6	223166.0	29.27989930	91.4539560	218.3	
M673	4/2	8/1/96 08:44:53.6- 08:46:05.6	35.5M	72.0	1961245.1	222628.4	29.27842389	91.4552261	219.1	
M674	4/2	8/1/96 08:46:19.3- 08:46:23.7	149.0-	4.4	1960964.2	222282.2	29.27745964	91.4560880	216.8	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M675	4/2	8/1/96 08:46:28.1- 08:47:10.3	42.0M	42.2	1960821.2	222097.5	29.27695465	91.4565413	217.5	
M676	4/2	8/1/96 08:47:17.9- 08:47:22.3	11.5+	4.4	1960614.3	221833.0	29.27621732	91.4571740	215.6	
M677	4/2	8/1/96 08:47:28.4- 08:47:31.1	9.0-	2.7	1960562.8	221748.6	29.27599808	91.4573568	218.3	
M678	4/2	8/1/96 08:47:57.0- 08:48:18.1	387.5M	21.1	1960328.2	221453.1	29.27517341	91.4580733	216.0	
M679	4/2	8/1/96 08:48:32.7- 08:50:40.2	33.5M	127.5	1959829.5	220765.7	29.27328535	91.4596407	216.7	
M680	4/2	8/1/96 08:51:05.9- 08:51:25.2	34.5M	19.3	1959277.8	220057.9	29.27134751	91.4613850	218.8	
M681	4/2	8/1/96 08:53:04.4- 08:53:12.1	55.0D	7.7	1958616.0	219251.7	29.26914235	91.4634781	221.5	
M682	4/2	8/1/96 18:16:09.6- 18:16:21.4	51.5M	11.8	1969250.6	232965.7	29.30684023	91.4300898	212.4	
M683	4/2	8/1/96 18:16:32.1- 18:16:38.2	107.5D	6.1	1969144.2	232800.5	29.30641367	91.4304712	218.3	
M684	4/2	8/1/96 18:16:57.4- 18:17:30.3	33.5M	32.9	1968895.3	232472.0	29.30549297	91.4312237	214.9	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M685	4/2	8/1/96 18:17:47.3- 18:18:04.8	16.0M	17.5	1968613.8	232080.8	29.30441185	91.4320977	213.9	
M686	4/2	8/1/96 18:18:43.8- 18:18:51.5	29.5D	7.7	1968313.2	231677.6	29.30332031	91.4330698	217.6	
M687	4/2	8/1/96 18:19:12.4- 18:19:24.5	25.0M	12.1	1968113.9	231415.2	29.30260768	91.4337090	219.5	
M688	4/2	8/1/96 18:19:38.2- 18:19:53.1	17.0M	14.9	1967972.7	231252.4	29.30214876	91.4341346	217.3	
M689	4/2	8/1/96 18:20:33.7- 18:20:38.1	56.5D	4.4	1967632.9	230800.7	29.30091953	91.4352203	220.0	
M690	4/2	8/1/96 18:21:42.7- 18:21:47.1	17.0D	4.4	1967176.5	230232.0	29.29934514	91.4366366	218.2	
M691	4/2	8/1/96 18:22:00.8- 18:22:03.5	127.0-	2.7	1967063.7	230094.3	29.29895729	91.4369760	216.4	
M692	4/2	8/1/96 18:23:02.2- 18:23:08.3	116.5D	6.1	1966651.2	229536.8	29.29743268	91.4382840	218.4	
M693	4/2	8/1/96 18:23:37.9- 18:23:50.0	55.0M	12.1	1966409.5	229238.1	29.29660996	91.4390400	218.2	
M694	4/2	8/1/96 18:24:16.9- 18:24:22.9	18.5-	6.0	1966155.9	228916.8	29.29572005	91.4398255	217.1	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M695	4/2	8/1/96 18:24:57.6- 18:25:16.9	28.0M	19.3	1965859.6	228520.1	29.29463516	91.4407648	218.4	
M696	4/2	8/1/96 18:26:25.9- 18:26:36.3	8.0M	10.4	1965309.4	227810.0	29.29267995	91.4424867	218.2	
M697	4/2	8/1/96 18:26:48.4- 18:26:59.3	42.0M	10.9	1965151.1	227615.3	29.29213145	91.4429624	215.6	
M698	4/2	8/1/96 18:27:38.5- 18:27:49.9	23.5M	11.4	1964818.8	227208.3	29.29095658	91.4435155	162.3	
M699	4/3	7/31/96 18:51:38.0- 18:51:41.3	248.0+	3.3	1969168.7	232553.7	29.30573743	91.4303973	218.8	
M700	4/3	7/31/96 18:52:03.8- 18:52:09.8	7.0+	6.0	1968997.6	232328.8	29.30511536	91.4309286	218.1	
M701	4/3	7/31/96 18:52:24.6- 18:52:35.0	17.5M	10.4	1968848.7	232137.5	29.30457249	91.4313683	214.8	
M702	4/3	7/31/96 18:53:01.9- 18:53:11.2	22.5M	9.3	1968612.0	231840.6	29.30373646	91.4320734	210.4	
M703	4/3	7/31/96 18:53:32.0- 18:53:38.1	14.5D	6.1	1968460.2	231581.3	29.30307057	91.4326307	220.5	
M704	4/3	7/31/96 18:54:27.9- 18:54:47.1	8.5M	19.2	1968044.8	231074.5	29.30165299	91.4338970	215.9	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M705	4/3	7/31/96 18:55:23.3- 18:55:27.7	27.5D	4.4	1967722.0	230671.1	29.30056178	91.4349382	219.7	
M706	4/3	7/31/96 18:57:29.1- 18:57:32.4	6.5-	3.3	1968896.9	229640.7	29.29771009	91.4374988	216.5	
M707	4/3	7/31/96 18:57:53.3- 18:58:00.5	9.5D	7.2	1966745.5	229426.0	29.29712207	91.4379779	217.1	
M708	4/3	7/31/96 18:58:32.4- 18:58:39.5	66.0D	7.1	1966492.3	229083.2	29.29616855	91.4387543	215.0	
M709	4/3	7/31/96 18:59:08.8- 18:59:21.7	11.5M	12.9	1966210.8	228688.7	29.29509401	91.4396545	217.3	
M710	4/3	7/31/96 18:59:41.5- 18:59:44.3	23.5+	2.8	1966061.9	228493.3	29.29455443	91.4401184	216.9	A150
M711	4/3	7/31/96 18:59:52.0- 18:59:56.3	49.5D	4.3	1965995.2	228397.4	29.29430326	91.4403467	219.4	A150
M712	4/3	7/31/96 19:01:37.0- 19:01:41.4	58.0D	4.4	1965264.1	227558.7	29.29196393	91.4425861	213.0	
M713	4/3	8/1/96 09:30:08.7- 09:30:12.0	34.5+	3.3	1963668.7	225439.4	29.28617528	91.4476538	221.8	
M714	4/3	8/1/96 09:30:22.4- 09:30:26.8	14.5+	4.4	1963595.3	225339.8	29.28589753	91.4478787	221.1	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M715	4/3	8/1/96 09:30:36.2- 09:30:46.7	87.5M	10.5	1963494.8	225234.0	29.28559284	91.4481738	218.6	
M716	4/3	8/1/96 09:31:56.9- 09:32:13.3	460.5M	16.4	1963006.5	224654.0	29.28398366	91.4496832	216.0	
M717	4/3	8/1/96 09:32:34.9- 09:34:17.9	82.0M	103.0	1962548.8	224045.3	29.28231407	91.4511263	217.2	
M718	4/3	8/1/96 09:37:10.3- 09:37:20.8	93.0D	10.5	1961217.3	222322.8	29.27756582	91.4552842	215.6	
M719	4/3	8/1/96 09:39:03.0- 09:39:27.1	152.0M	24.1	1960542.5	221450.8	29.27519321	91.4574401	221.0	
M720	4/3	8/1/96 09:39:42.0- 09:39:55.6	44.5M	13.6	1960360.4	221236.4	29.27460645	91.4580153	221.6	
M721	4/3	8/1/96 09:43:18.0- 09:43:52.3	46.0M	34.3	1959099.8	219605.7	29.27008656	91.4619145	215.4	
M722	4/3	8/1/96 09:45:22.4- 09:46:49.3	48.5M	86.9	1958130.5	218379.3	29.26675143	91.4650102	223.2	
M723	4/4	8/1/96 07:16:10.2- 07:16:28.3	71.5D	18.1	1968352.5	231250.4	29.30213452	91.4329270	215.3	
M724	4/4	8/1/96 07:18:44.7- 07:18:49.1	13.5D	4.4	1967561.4	230226.1	29.29932083	91.4354146	216.4	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M725	4/4	8/1/96 07:19:13.3- 07:19:19.3	13.0D	6.0	1967400.1	230004.1	29.29871789	91.4359329	218.0	
M726	4/4	8/1/96 07:20:05.9- 07:20:11.4	118.5D	5.5	1967118.4	229636.8	29.29769240	91.4367914	215.0	
M727	4/4	8/1/96 07:21:08.6- 07:21:14.6	40.0D	6.0	1966792.3	229159.6	29.29642911	91.4378862	224.5	
M728	4/4	8/1/96 07:21:26.7- 07:21:31.1	49.0-	4.4	1966685.8	229023.0	29.29604314	91.4382069	222.7	
M729	4/4	8/1/96 07:22:29.7- 07:22:32.5	6.5-	2.8	1966300.2	228609.6	29.29487015	91.4393632	216.0	
M730	4/4	8/1/96 10:14:28.5- 10:15:06.3	36.0M	37.8	1963850.2	225445.4	29.28613545	91.4469882	209.9	
M731	4/4	8/1/96 10:16:25.9- 10:16:51.1	86.0M	25.2	1963258.2	224670.7	29.28405353	91.4489298	220.6	
M732	4/4	8/1/96 10:16:54.4- 10:17:07.6	2238.5-	13.2	1963156.0	224579.6	29.28376400	91.4491860	212.6	
M733	4/4	8/1/96 10:23:49.5- 10:24:13.6	231.0M	24.1	1960884.6	221586.5	29.27559553	91.4564042	226.0	
M734	4/4	8/1/96 10:32:45.2- 10:32:52.9	56.5M	7.7	1958002.5	217898.4	29.26540554	91.4653778	218.9	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M735	4/5	8/1/96 08:03:28.1- 08:03:35.8	8.5+	7.7	1965382.5	227159.8	29.29167116	91.4415788	40.0	
M736	4/5	8/1/96 08:06:26.8- 08:06:35.5	8.0+	8.7	1966353.2	228376.1	29.29501335	91.4385300	41.0	
M737	4/5	8/1/96 08:07:52.4- 08:08:01.4	74.5+	9.0	1966831.5	228949.7	29.29660952	91.4370571	37.6	
M738	4/5	8/1/96 08:10:29.8- 08:10:34.2	307D	4.4	1967636.5	230046.8	29.29963600	91.4345473	36.1	
M739	4/5	8/1/96 08:16:20.9- 08:16:29.7	10.5-	8.8	1969518.1	232430.7	29.30620343	91.4286632	34.5	B49
M740	4/5	8/1/96 11:00:28.9- 11:00:39.3	863.0-	10.4	1963325.5	224502.8	29.28354056	91.4486285	209.6	
M741	4/5	8/1/96 11:14:50.1- 11:14:58.9	44.0-	8.8	1958751.4	218603.8	29.26736301	91.4630537	221.8	
M742	4/6	8/1/96 07:46:53.6- 07:47:20.5	27.0M	26.9	1969655.9	232390.0	29.30527867	91.4288531	216.8	
M743	4/6	8/1/96 07:49:05.9- 07:49:26.8	25.0D	20.9	1968983.8	231565.0	29.30303485	91.4309990	221.9	
M744	4/6	8/1/96 07:51:31.2- 07:51:38.8	37.0-	7.6	1968183.1	230497.3	29.30008426	91.4334903	219.6	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M745	4/6	8/1/96 07:53:52.3- 07:54:01.0	108.5D	8.7	1967420.0	229482.2	29.29727459	91.4358558	216.3	
M746	4/6	8/1/96 07:56:10.4- 07:56:14.8	20.5D	4.4	1966635.2	228513.4	29.29460208	91.4383042	215.0	
M747	4/6	8/1/96 07:56:25.2- 07:56:28.0	60.5+	2.8	1966546.5	228401.8	29.29428525	91.4385647	212.9	
M748	4/6	8/1/96 07:57:00.9- 07:57:04.2	14.5+	3.3	1966357.3	228128.8	29.29354297	91.4391737	214.9	
M749	4/6	8/1/96 07:57:18.9- 07:57:22.3	11.5+	3.4	1966259.5	227984.6	29.29316133	91.4395053	218.0	
M750	4/6	8/1/96 07:57:34.3- 07:57:37.2	11+	2.9	1966177.5	227869.0	29.29284766	91.4397690	218.9	
M751	4/6	8/1/96 07:57:41.5- 07:57:45.9	58.0+	4.4	1966122.7	227799.9	29.29265817	91.4399418	219.0	
M752	4/6	8/1/96 11:23:08.2- 11:23:21.3	50.0M	13.1	1957972.2	217425.8	29.26493081	91.4648763	29.3	B51
M753	4/6	8/1/96 11:23:35.1- 11:23:37.9	8.5-	2.8	1958061.3	217620.5	29.26544200	91.4645498	35.0	B51
M754	4/6	8/1/96 11:25:15.4- 11:25:18.7	22.5+	3.3	1958663.8	218317.9	29.26732105	91.4626018	42.9	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M755	4/6	8/1/96 11:25:30.7- 11:25:47.1	183.0M	16.4	1958793.2	218453.2	29.26772485	91.4622418	37.0	
M756	4/6	8/1/96 11:27:15.5- 11:27:21.5	13.5D	6.0	1959400.6	219196.2	29.26975343	91.4603144	40.2	
M757	4/6	8/1/96 11:27:44.0- 11:28:03.8	51.0M	19.8	1959600.1	219426.6	29.27038333	91.4596833	41.0	
M758	4/6	8/1/96 11:31:31.8- 11:32:29.0	35.5M	57.2	1960856.1	221077.4	29.27494938	91.4557840	36.6	B54, B55
M759	4/6	8/1/96 11:34:39.6- 11:34:53.3	13.0M	13.7	1961952.0	222464.2	29.27877969	91.4523746	33.7	
M760	4/6	8/1/96 11:35:26.3- 11:35:33.4	49.0D	7.1	1962156.8	222773.4	29.27961012	91.4516988	38.0	
M761	4/6	8/1/96 11:36:10.9- 11:36:27.4	17.0M	16.5	1962428.3	223122.9	29.28054288	91.4508071	43.5	
M762	4/6	8/1/96 11:37:39.9- 11:37:47.0	17.0M	20.1	1962957.9	223718.9	29.28222467	91.4492087	35.6	
M763	4/6	8/1/96 11:38:17.2- 11:38:19.9	14.5+	2.7	1963137.9	223974.7	29.28291644	91.4486251	38.0	
M764	4/6	8/1/96 11:39:05.4- 11:39:29.0	724.0M	23.6	1963499.6	224454.1	29.28424418	91.4475058	36.3	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M765	4/6	8/1/96 11:39:35.0- 11:39:54.6	40.5+	19.6	1963628.7	224615.3	29.28470074	91.4471239	33.6	
M766	4/7	8/1/96 07:36:49.3- 07:37:00.8	12.5D	11.5	1968128.8	230098.1	29.29976380	91.4329797	39.0	B56
M767	4/7	8/1/96 07:39:25.2- 07:39:37.2	11.0M	12.0	1968946.8	231213.6	29.30283333	91.4304167	39.0	
M768	4/7	8/1/96 10:37:06.5- 10:37:33.3	26.0M	26.8	1958087.1	217264.8	29.26443503	91.4644225	40.8	
M769	4/7	8/1/96 10:40:27.2- 10:40:33.2	16.5-	6.0	1959139.9	218594.3	29.26812549	91.4611748	34.5	
M770	4/7	8/1/96 10:41:37.8- 10:41:51.6	530.0M	13.8	1959520.5	219134.7	29.26959551	91.4599545	38.1	
M771	4/7	8/1/96 10:42:12.4- 10:42:16.7	7.5D	4.3	1959722.8	219371.0	29.27025272	91.4593315	36.7	B57
M772	4/7	8/1/96 10:50:19.8- 10:50:56.1	15.5M	36.3	1962525.3	222923.4	29.28004550	91.4505808	33.4	
M773	4/7	8/1/96 10:51:37.8- 10:51:58.8	18.5M	21.0	1962916.0	223476.8	29.28154669	91.4493200	38.0	
M774	4/7	8/1/96 10:53:03.5- 10:53:06.3	38.0+	2.8	1963347.2	224018.7	29.28302852	91.4479548	39.9	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M775	4/7	8/1/96 10:53:49.7- 10:54:01.9	655.0+	12.2	1963659.8	224390.1	29.28406021	91.4469898	38.0	
M776	4/7	8/1/96 10:54:15.6- 10:54:21.1	74.0D	5.5	1963755.0	224532.7	29.28443066	91.4466597	42.2	
M777	4/8	7/31/96 19:08:37.0- 19:08:53.4	14.5-	16.4	1966150.0	227336.7	29.29217995	91.4392034	36.0	B64
M778	4/8	7/31/96 19:10:57.8- 19:11:02.2	8.0-	4.4	1966782.6	228122.2	29.29434310	91.4372236	35.7	
M779	4/8	7/31/96 19:13:36.7- 19:13:44.3	17.0D	7.6	1967500.7	229095.2	29.29698268	91.4349173	43.0	
M780	4/8	7/31/96 19:14:42.9- 19:14:47.3	44.0D	4.4	1967826.6	229486.3	29.29807789	91.4339221	39.5	
M781	4/8	7/31/96 19:19:11.0- 19:19:17.1	43.0D	6.1	1969096.4	231096.9	29.30252201	91.4299613	37.2	
M782	4/8	8/1/96 09:53:40.5- 09:53:51.0	10.5M	10.5	1958381.7	217329.4	29.26464128	91.4635421	35.3	
M783	4/8	8/1/96 09:54:21.1- 09:54:37.5	126.5M	16.4	1958608.4	217658.6	29.26554378	91.4628264	36.0	
M784	4/8	8/1/96 09:55:19.8- 09:55:22.4	25.0+	2.6	1958869.7	218022.1	29.26654248	91.4620050	36.4	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M785	4/8	8/1/96 09:55:46.6- 09:56:19.5	8.5M	32.9	1959077.8	218320.1	29.26733122	91.4613070	42.4	
M786	4/8	8/1/96 09:56:27.2- 09:57:06.2	26.5M	39.0	1959366.9	218643.8	29.26824857	91.4604398	37.4	
M787	4/8	8/1/96 09:58:32.9- 09:59:24.0	26.5M	51.1	1960152.3	219618.5	29.27093333	91.4579833	37.0	
M788	4/8	8/1/96 09:59:57.0- 10:00:00.4	7.5+	3.4	1960422.9	219974.8	29.27192646	91.4571569	34.4	
M789	4/8	8/1/96 10:04:21.1- 10:04:46.9	68.5D	25.8	1961916.0	221902.9	29.27721549	91.4524512	38.0	
M790	4/8	8/1/96 10:08:60.0- 10:09:04.9	12.5D	4.9	1963369.9	223802.8	29.28243508	91.4477982	39.8	
M791	4/8	8/1/96 10:10:12.0- 10:10:24.0	43.0-	12.0	1963816.9	224336.2	29.28390731	91.4464890	39.0	
M792	4/8	8/1/96 10:10:37.8- 10:10:40.5	9.0+	2.7	1963920.1	224473.1	29.28427116	91.4461470	41.5	
M793	4/9	7/31/96 18:35:45.7- 18:35:50.1	7.5-	4.4	1966860.3	227993.4	29.29396211	91.4369379	41.0	
M794	4/9	7/31/96 18:36:29.2- 18:36:32.0	11.0+	2.8	1967074.6	228256.1	29.29468430	91.4362657	41.1	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M795	4/9	7/31/96 18:38:49.9- 18:38:53.2	24.0+	3.3	1967758.8	229121.9	29.29709753	91.4341691	35.1	
M796	4/9	7/31/96 18:41:44.3- 18:41:51.5	7.0D	7.2	1968596.7	230221.4	29.30011064	91.4315227	37.7	
M797	4/9	7/31/96 18:42:29.3- 18:42:45.8	43.5M	16.5	1968804.0	230491.8	29.30084362	91.4308564	39.8	
M798	4/9	8/1/96 09:03:49.2- 09:03:55.2	31.0D	6.0	1968963.3	217799.8	29.26592733	91.4617040	37.2	
M799	4/9	8/1/96 09:09:47.9- 09:09:55.7	12.0D	7.8	1960863.7	220231.9	29.27262630	91.4557605	36.2	
M800	4/9	8/1/96 09:11:10.2- 09:11:15.1	9.5-	4.9	1961262.3	220783.8	29.27415062	91.4545218	35.0	
M801	4/9	8/1/96 09:14:00.3- 09:14:22.5	16.0M	22.2	1962182.7	222028.0	29.27755020	91.4515998	40.0	
M802	4/9	8/1/96 09:19:40.7- 09:19:51.1	969.0+	10.4	1963958.4	224276.2	29.28375406	91.4460626	36.8	
M803	4/10	7/31/96 17:20:42.1- 17:20:45.4	7.0+	3.3	1959379.9	218110.9	29.26679219	91.4604122	35.5	
M804	4/10	7/31/96 17:21:18.3- 17:21:24.4	16.0D	6.1	1959568.1	218373.9	29.26751364	91.4598187	36.1	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M805	4/10	7/31/96 17:26:51.1- 17:27:01.6	32.5D	10.5	1961338.1	220619.7	29.27368066	91.4542527	38.9	B69
M806	4/10	7/31/96 17:28:30.4- 17:28:33.3	5.5+	2.9	1961837.0	221257.1	29.27543952	91.4526969	38.0	B70
M807	4/10	7/31/96 17:35:33.3- 17:36:01.9	318.5D	28.6	1964082.8	224208.7	29.28355332	91.4456483	39.8	B71
M808	4/10	7/31/96 17:36:38.1- 17:36:45.2	17.5D	7.1	1964346.9	224530.8	29.28444616	91.4448303	38.6	B71
M809	4/10	NOT AN ANOMALY	-	-	-	-	-	-	-	
M810	4/11	7/4/96 07:36:48.2- 07:36:53.9	46.0D	5.7	1960032.1	218720.9	29.26845348	91.4583399	39.2	
M811	4/11	7/4/96 07:37:26.8- 07:37:34.0	34.0D	7.2	1960216.6	218955.7	29.26910218	91.4577656	38.7	
M812	4/11	7/4/96 07:46:20.8- 07:46:25.0	12.0D	4.2	1962726.8	222176.1	29.2779799	91.4499267	35.8	
M813	4/11	7/4/96 07:48:41.7- 07:48:46.1	86.0D	4.4	1963373.5	223029.9	29.28029684	91.4478516	42.2	
M814	4/11	7/4/96 07:51:50.7- 07:51:58.4	574.5-	7.7	1964276.7	224151.9	29.23841549	91.4450678	36.3	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M815	4/11	7/4/96 08:00:19.4- 08:00:28.3	16.0+	8.9	1966726.5	227262.1	29.29198682	91.4374132	33.7	
M816	4/11	7/4/96 08:02:37.2- 08:02:40.1	18.0+	2.9	1967317.3	2281229.3	29.29433901	91.4355073	40.7	
M817	4/11	7/4/96 08:04:34.1- 08:04:38.5	10.0-	4.4	1967909.5	228895.1	29.29640234	91.4335977	48.3	
M818	4/11	7/4/96 08:05:25.1- 08:05:29.5	11.5D	4.4	1968200.7	229169.0	29.29727533	91.4328873	23.0	
M819	4/11	7/4/96 08:08:17.9- 08:08:22.3	232.5+	4.4	1969064.2	230279.4	29.30029001	91.4300883	33.7	
M820	4/12	7/4/96 10:27:27.7- 10:27:32.1	6.5-	4.4	1967947.1	228728.7	29.29521986	91.4342257	219.6	
M821	4/12	7/4/96 10:27:54.7- 10:28:11.1	18.5-	16.4	1967775.6	228511.4	29.29462122	91.4347621	219.4	
M822	4/12	7/4/96 10:28:25.9- 10:28:38.1	10.0M	12.2	1967585.8	228290.8	29.29397031	91.4352797	210.0	
M823	4/12	7/4/96 10:30:24.6- 10:30:54.4	10.5M	29.8	1966890.0	227255.6	29.29116478	91.4375352	219.3	
M824	4/12	7/4/96 10:33:16.8- 10:33:20.1	148.0+	3.3	1965909.7	225959.5	29.28757113	91.4405622	213.7	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M825	4/12	7/4/96 10:35:21.5- 10:35:30.8	54.5+	9.3	1965083.4	224961.3	29.28486331	91.4432133	221.6	
M826	4/12	7/4/96 10:36:51.4- 10:37:18.4	442.0D	27.0	1964345.2	224125.4	29.28253400	91.4454829	216.0	
M827	4/12	7/4/96 10:49:18.6- 10:49:29.1	26.5+	10.5	1959824.1	218199.5	29.26623258	91.4596561	217.6	
M828	4/13	7/4/96 11:50:21.0- 11:50:59.9	61.5D	38.9	1966946.7	227145.4	29.29085755	91.4373505	218.4	
M829	4/13	7/4/96 11:57:45.0- 11:58:10.3	1,243.5-	25.3	1964578.1	224050.3	29.28234212	91.4447745	218.9	
M830	4/13	7/4/96 11:58:53.7- 11:59:09.0	10.0D	15.3	1964176.7	223565.2	29.28099795	91.4460180	217.1	
M831	4/13	7/4/96 12:00:07.3- 12:00:10.5	10.5+	3.2	1963760.1	223039.6	29.27956136	91.4473386	219.0	
M832	4/13	7/4/96 12:05:10.5- 12:05:18.1	33.0M	7.6	1962052.4	220723.6	29.27319102	91.4526923	219.7	
M833	4/13	7/4/96 12:10:54.0- 12:11:07.2	8.5-	13.2	1960032.8	218185.2	29.26619368	91.4590011	217.6	
M834	4/13	7/4/96 12:13:12.0- 12:13:49.3	8.5D	37.3	1959198.9	217143.9	29.26334681	91.4616410	221.3	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M835	4/14	7/4/96 13:14:18.5- 13:14:33.9	65.5D	15.4	1960162.0	218122.3	29.26681896	91.4579477	37.0	
M836	4/14	7/4/96 13:17:39.7- 13:17:41.3	14.0+	1.6	1961288.3	219573.0	29.27078194	91.4543771	42.6	
M837	4/14	7/4/96 13:25:08.0- 13:25:13.0	5.0-	5.0	1963782.9	222797.2	29.27968861	91.4465814	40.2	
M838	4/14	7/4/96 13:26:17.2- 13:26:26.5	8.0D	9.3	1964201.3	223284.6	29.28102444	91.4452922	37.5	
M839	4/14	7/4/96 13:27:15.9- 13:27:23.7	8.5D	7.8	1964533.8	223701.0	29.28215729	91.4442307	40.0	
M840	4/14	7/4/96 13:27:47.2- 13:28:11.4	1,172.5M	24.2	1964755.7	223984.9	29.28292276	91.4435136	42.9	
M841	4/14	7/4/96 13:29:02.4- 13:29:06.8	26.0D	4.4	1965160.6	224460.9	29.28424900	91.4422673	40.0	
M842	4/14	7/4/96 13:29:27.7- 13:29:31.0	6.0+	3.3	1965295	224630.3	29.28470473	91.4418302	41.9	
M843	4/14	7/4/96 13:40:18.6- 13:40:24.7	9.0+	6.1	1968933.4	229381.5	29.29778178	91.4304349	41.5	
M844	4/14	7/4/96 13:41:55.1- 13:42:18.7	30.0M	23.6	1969529.6	230178.7	29.29997026	91.4285595	42.4	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M845	4/14	7/4/96 13:42:51.8- 13:42:59.5	9.0+	7.7	1969831.8	230478.8	29.30085482	91.4277095	30.3	
M846	4/15	7/4/96 11:00:51.9- 11:01:05.0	48.5M	13.1	1959742.7	217369.9	29.26471168	91.4592075	43.9	
M847	4/15	7/4/96 11:02:47.1- 11:02:55.9	39.0D	8.8	1960389.3	218019.0	29.26654948	91.4572586	34.0	
M848	4/15	7/4/96 11:06:11.1- 11:06:18.7	32.0-	7.6	1961358.9	219354.5	29.27023783	91.4542470	31.1	
M849	4/15	7/4/96 11:09:35.1- 11:09:45.6	98.0D	10.5	1962449.3	220750.8	29.27404922	91.4507754	38.0	
M850	4/15	7/4/96 11:10:15.9- 11:10:38.3	139.0D	22.4	1962671.8	221027.7	29.27481758	91.4500883	36.7	
M851	4/15	7/4/96 11:16:36.9- 11:16:44.0	27.5+	7.1	1964645.9	223596.2	29.28186680	91.4438749	40.5	
M852	4/15	7/4/96 11:17:23.4- 11:17:45.4	2,856.5M	22.0	1964915.8	223934.3	29.28279987	91.4430335	40.0	
M853	4/15	7/4/96 11:30:12.5- 11:30:15.9	16.0+	3.4	1969135.7	229341.5	29.29769551	91.4298348	37.0	
M854	4/15	7/4/96 11:30:50.4- 11:30:54.8	7.5+	4.4	1969347.0	229623.9	29.29847059	91.4291696	37.4	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M855	4/15	7/4/96 11:31:47.5- 11:31:53.6	18.5D	6.1	1969663.0	230049.3	29.29963818	91.4281745	38.0	
M856	4/15	7/4/96 11:32:09.5- 11:32:12.8	8.0-	3.3	1969774.1	230187.0	29.30001315	91.4278202	38.8	
M857	4/17	7/4/96 08:18:36.0- 08:18:40.4	9.5+	4.4	1970413.5	230453.9	29.29997238	91.4264962	220.0	
M858	4/17	7/4/96 08:20:59.8- 08:21:05.8	8.5D	6.0	1969528.8	229330.8	29.29687492	91.4292584	218.7	BB4

**INVENTORY OF MAGNETIC ANOMALIES AT ATCHAFALAYA ODMDS
SURVEY BLOCK 5**

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M859	5/1	8/3/96 10:41:48.2- 10:41:42.2	111.0-	6.0	1969930.2	234013.2	29.31024212	91.4278108	213.7	
M860	5/1	8/3/96 10:11:22.5- 10:11:29.6	49.0M	7.1	1981141.0	246401.0	29.34963535	91.3927136	235.2	
M861	5/1	8/3/96 10:11:35.7- 10:11:43.3	39.5M	7.6	1981017.2	248316.8	29.34937318	91.3930768	223.8	
M862	5/1	8/3/96 10:11:59.9- 10:12:07.5	201.0M	7.6	1980847.0	248131.9	29.34888471	91.3936113	224.0	
M863	5/1	8/3/96 10:16:14.6- 10:16:18.0	200.0D	3.4	1979261.4	246041.2	29.34308476	91.3985486	211.3	
M864	5/1	8/3/96 10:17:32.6- 10:17:48.0	171.0M	15.4	1978819.5	245388.8	29.34132613	91.3999775	227.1	
M865	5/1	8/3/96 10:18:27.0- 10:18:33.0	101.5+	5.0	1978501.5	244977.3	29.34017533	91.4009553	219.5	
M866	5/1	8/3/96 10:21:43.3- 10:21:46.5	557.0-	3.2	1977313.1	243487.8	29.33606584	91.4046675	214.3	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M867	5/1	8/3/96 10:27:27.1- 10:27:34.3	313.3-	7.2	1975234.7	240817.1	29.32871683	91.4111832	214.0	
M868	5/1	8/3/96 10:31:37.2- 10:31:42.2	70.0-	5.0	1973706.6	238824.3	29.32323385	91.4159742	214.0	
M869	5/1	8/3/96 10:39:29.8- 10:39:33.2	62.5+	3.4	1970771.6	235092.8	29.31298060	91.4251930	220.6	
M870	5/1	8/3/96 10:41:42.2- 10:41:48.2	111.0-	6.0	1969930.2	234013.2	29.31024212	91.4278108	213.7	
M871	5/2	8/3/96 11:25:16.8- 11:25:24.0	42.5D	7.2	1980696.1	247450.6	29.34697201	91.3940613	215.8	
M872	5/2	8/3/96 11:25:57.2- 11:26:03.0	18.5-	5.8	1980417.8	247184.4	29.34625117	91.3949488	220.9	
M873	5/2	8/3/96 11:26:51.4- 11:26:54.1	21.5+	2.7	1980152.0	246802.7	29.34519154	91.3957709	216.8	
M874	5/2	8/3/96 11:27:01.8- 11:27:08.9	28.5D	7.1	1980072.3	246708.2	29.34494502	91.3960367	222.6	
M875	5/2	8/3/96 11:28:00.4- 11:28:03.1	616.5+	2.7	1979724.7	246351.7	29.34396045	91.3971229	221.1	B89
M876	5/2	8/3/96 11:29:20.0- 11:29:25.5	24.5+	5.5	1979301.7	245759.0	29.34229948	91.3984057	206.3	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M877	5/2	8/3/96 11:33:30.1- 11:33:57.0	41.5M	26.9	1978085.9	244188.4	29.3379561	91.4022311	210.3	
M878	5/2	8/3/96 11:35:03.4- 11:35:07.8	59.0D	4.4	1977616.3	243650.4	29.33652435	91.4037301	219.3	
M879	5/2	8/3/96 11:36:52.6- 11:36:57.0	141.4+	4.4	1977013.1	242887.1	29.33441237	91.4056064	213.9	
M880	5/2	8/3/96 11:37:13.5- 11:37:18.4	30.0D	4.9	1976907.5	242716.9	29.33396458	91.4059623	222.9	
M881	5/2	8/3/96 11:37:30.0- 11:37:33.3	20.0-	3.3	1976822.1	242412.7	29.33367549	91.4062275	221.9	
M882	5/2	8/3/96 11:38:16.9- 11:38:19.9	25.0+	3.0	1976580.2	242272.1	29.33271283	91.4069519	210.0	
M883	5/2	8/3/96 11:38:57.2- 11:39:09.3	33.0M	12.1	1976349.8	241955.6	29.33186322	91.4077035	220.0	
M884	5/2	8/3/96 11:39:55.9- 11:40:03.0	23.5M	7.1	1976048.2	241569.4	29.33081712	91.4086662	226.8	
M885	5/2	8/3/96 11:40:10.7- 11:40:14.0	26.0+	3.3	1975964.3	241485.0	29.33056198	91.4089047	217.3	
M886	5/2	8/3/96 11:40:53.2- 11:40:58.9	244.5D	5.7	1975734.6	241172.0	29.32969281	91.4096135	213.4	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M887	5/2	8/3/96 11:41:40.6- 11:41:48.3	211.0D	7.7	1975492.9	240828.4	29.32876830	91.4103975	222.8	
M888	5/2	8/3/96 11:45:08.1- 11:45:21.3	339.0M	13.2	1974328.2	239380.1	29.32478366	91.4140497	223.0	
M889	5/2	8/3/96 11:45:24.5- 11:45:28.9	23.5D	4.4	1974246.6	239301.0	29.32456367	91.4143030	222.0	
M890	5/2	8/3/96 11:46:24.4- 11:46:30.5	376.0D	6.1	1973882.2	238878.2	29.32338711	91.4154296	216.2	
M891	5/2	8/3/96 11:50:21.1- 11:51:34.5	68.5M	73.4	1972426.4	236924.0	29.31801100	91.4199945	216.7	
M892	5/2	8/3/96 11:51:39.5- 11:51:48.3	802.0D	8.8	1972168.9	236627.4	29.31720384	91.4208128	220.7	
M893	5/2	8/3/96 11:52:27.2- 11:52:33.2	211.0M	6.0	1971916.8	236291.6	29.31625768	91.4215727	210.2	
M894	5/2	8/3/96 11:52:53.0- 11:52:55.8	25.5-	2.8	1971800.1	236110.5	29.31576686	91.4219498	214.0	
M895	5/2	8/3/96 11:54:24.5- 11:55:31.6	131.5M	67.1	1971153.5	235326.1	29.31361393	91.4239842	216.6	
M896	5/2	8/3/96 11:56:42.4- 11:56:54.5	65.5M	12.1	1970484.5	234481.0	29.31129447	91.4260889	219.3	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M897	5/2	8/3/96 11:58:43.6- 11:58:46.9	212.0-	3.3	1969831.0	233654.0	29.30900511	91.4281188	213.0	
M898	5/2	8/3/96 11:58:59.0- 11:59:06.6	56.0D	7.6	1969732.7	233521.7	29.30864740	91.4284359	216.0	
M899	5/2	8/3/96 11:59:39.5- 12:00:03.6	57.5M	24.1	1969532.1	233166.2	29.30765000	91.4290333	206.0	
M900	5/2	8/3/96 12:00:14.0- 12:00:16.7	67.0-	2.7	1969393.5	232965.2	29.30715903	91.4295410	233.1	
M901	5/3	8/3/96 10:46:12.0- 10:46:28.4	57.0M	27.4	1969659.8	233257.0	29.30819004	91.4283600	44.0	
M902	5/3	8/3/96 10:53:19.6- 10:53:27.3	100.0+	7.7	1972217.3	236417.6	29.31692240	91.4203906	27.7	
M903	5/3	8/3/96 10:55:30.2- 10:55:34.3	78.0+	4.1	1973018.7	237391.6	29.31958926	91.4178572	34.6	
M904	5/3	8/3/96 10:56:37.3- 10:56:42.3	104.0+	5.0	1973393.2	237953.8	29.32115609	91.4167182	23.5	B91
M905	5/3	8/3/96 10:59:07.7- 10:59:20.9	91.5M	13.2	1974314.8	239161.3	29.32446621	91.4138059	30.7	
M906	5/3	8/3/96 11:00:33.3- 11:00:40.4	61.0-	7.1	1974765.6	239767.1	29.32612364	91.4123787	35.3	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M907	5/3	8/3/96 11:02:28.5- 11:02:38.9	95.0+	10.4	1975585.0	240588.9	29.32836087	91.4097816	45.7	
M908	5/3	8/3/96 11:02:48.2- 11:05:54.3	105.5M	186.0	1976134.5	241370.0	29.33052031	91.4080695	41.4	
M909	5/3	8/3/96 11:07:46.4- 11:07:56.8	35.3-	10.2	1977253.7	242908.9	29.33476504	91.4045733	35.6	
M910	5/3	8/3/96 11:11:10.6- 11:11:19.9	25.0+	9.3	1978304.2	244239.0	29.33843685	91.4012965	30.8	
M911	5/3	8/3/96 11:12:18.2- 11:12:21.0	41.5-	2.8	1978618.4	244648.6	29.33958302	91.4003500	19.0	
M912	5/3	8/3/96 11:16:13.8- 11:16:18.2	161.0D	4.4	1979783.6	246184.2	29.34376476	91.3966260	35.7	
M913	5/4	8/3/96 12:07:27.2- 12:07:34.8	34.0-	7.6	1969971.7	233363.2	29.30821315	91.4273868	41.9	
M914	5/4	8/3/96 12:11:27.3- 12:11:33.4	25.5-	6.1	1971209.7	234892.1	29.31272266	91.4235440	29.0	
M915	5/4	8/3/96 12:12:22.8- 12:12:26.2	44.0+	3.4	1971441.5	253277.5	29.31375345	91.4227782	42.8	
M916	5/4	8/3/96 12:13:01.9- 12:13:15.6	76.5M	13.7	1971746.7	235496.6	29.31434401	91.4218090	47.7	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M917	5/4	8/3/96 12:21:42.4- 12:21:46.8	189.5D	4.4	1974377.8	238984.1	29.32395626	91.4135771	41.3	
M918	5/4	8/3/96 12:23:24.6- 12:23:30.5	27.5M	5.9	1974943.6	239642.2	29.32577298	91.4118104	38.7	
M919	5/4	8/3/96 12:24:21.4- 12:24:48.7	148.0M	27.3	1975287.4	240093.9	29.32700065	91.4107160	45.0	
M920	5/4	8/3/96 12:25:12.3- 12:25:18.4	34.5+	6.1	1975511.8	240382.5	29.32781488	91.4100351	36.5	
M921	5/4	8/3/96 12:26:11.3- 12:26:41.1	595.0M	29.8	1975840.9	240813.3	29.32897463	91.4089754	47.1	
M922	5/4	8/3/96 12:27:08.1- 12:27:10.8	25.0+	2.7	1976114.1	241138.9	29.32988965	91.4081385	39.8	
M923	5/4	8/3/96 12:27:48.8- 12:27:57.5	64.0+	8.7	1976320.7	241425.1	29.33069469	91.4075146	31.1	
M924	5/4	8/3/96 12:28:32.0- 12:28:38.0	26.5+	6.0	1976506.1	241758.2	29.33156667	91.4068833	50.0	
M925	5/4	8/3/96 12:30:45.8- 12:30:59.0	31.0M	13.2	1977248.8	242612.5	29.33391574	91.4045528	50.6	
M926	5/4	8/3/96 12:31:31.9- 12:31:35.2	75.5-	3.3	1977487.1	242894.2	29.33472949	91.4038470	34.6	B98

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M927	5/4	8/3/96 12:32:48.4- 12:32:56.0	22.5M	7.6	1977869.6	243446.2	29.33626530	91.4026757	25.5	
M928	5/4	8/3/96 12:34:43.8- 12:35:09.6	35.5M	25.8	1978490.4	244254.3	29.33844570	91.4006710	45.6	B99
M929	5/4	8/3/96 12:35:52.9- 12:36:16.9	28.5M	24.0	1978843.6	244670.5	29.33961953	91.3995971	33.3	B100
M930	5/4	8/3/96 12:38:41.3- 12:38:45.6	23.0D	4.3	1979189.2	245118.2	29.34083916	91.3984971	38.8	B101
M931	5/4	8/3/96 12:40:53.3- 12:41:47.1	47.0M	53.8	1979833.1	246051.8	29.34339368	91.3964626	44.6	
M932	5/4	8/3/96 12:43:35.0- 12:43:42.8	35.5D	7.8	1980584.9	247005.7	29.34601484	91.3941018	45.8	
M933	5/5	8/3/96 13:16:17.2- 13:16:54.5	58.5M	37.3	1981583.1	247903.3	29.34823483	91.3912978	223.0	B113
M934	5/5	8/3/96 13:17:49.9- 13:18:35.0	52.0M	45.1	1981026.3	247016.1	29.34581507	91.3930632	231.1	B110, B111, B112
M935	5/5	8/3/96 13:19:34.9- 13:20:15.5	52.0M	40.6	1980479.5	246486.7	29.3443218	91.3947685	216.9	B109
M936	5/5	8/3/96 13:21:06.3- 13:22:51.4	97.5M	105.1	1979766.6	245534.9	29.34172096	91.3969971	223.8	B107

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M937	5/5	8/3/96 13:25:24.4- 13:25:28.8	58.5D	4.4	1978692.2	244139.8	29.33789695	91.4003796	229.3	
M938	5/5	8/3/96 13:27:27.3- 13:27:42.6	44.5M	15.3	1978051.0	243325.0	29.33563217	91.4023678	220.1	
M939	5/5	8/3/96 13:28:30.4- 13:28:33.7	31.0+	3.3	1977708.8	243001.6	29.33473798	91.4034358	218.3	
M940	5/5	8/3/96 13:31:51.3- 13:32:21.4	68.5M	30.1	1976574.4	241446.7	29.33046638	91.4070003	221.0	
M941	5/5	8/3/96 13:33:04.9- 13:33:10.9	533.0+	6.0	1976312.2	241074.9	29.32941837	91.4077878	209.2	B105
M942	5/5	8/3/96 13:33:59.2- 13:34:40.9	913.5+	41.7	1975928.6	240610.1	29.32818600	91.4090460	229.5	B105
M943	5/5	8/3/96 13:36:54.8- 13:37:08.0	69.0M	13.2	1975023.9	239465.3	29.32501016	91.4118565	219.1	
M944	5/5	8/3/96 13:44:48.6- 13:44:57.4	121.5	8.8	1972510.6	236270.5	29.31621015	91.4197232	214.8	
M945	5/5	8/3/96 13:48:05.0- 13:48:12.7	34.0+	7.7	1971537.3	234929.3	29.31254604	91.4228040	226.0	
M946	5/5	8/3/96 13:53:46.9- 13:53:50.2	43.0+	3.3	1969775.3	232742.4	29.30650981	91.4283069	218.4	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M947	5/6	8/3/96 14:03:49.9- 14:03:53.2	58.0+	3.3	1972346.2	235826.4	29.31529408	91.4199798	29.2	
M948	5/6	8/3/96 14:06:55.9- 14:07:11.3	24.5M	15.4	1973348.8	237166.2	29.31895105	91.4167979	42.9	
M949	5/6	8/3/96 14:09:13.0- 14:09:36.6	22.0M	23.6	1974139.8	238026.1	29.32125820	91.4142754	64.0	
M950	5/6	8/3/96 14:09:58.0- 14:10:05.1	133.5-	7.1	1974324.6	238259.0	29.32198529	91.4137740	30.4	
M951	5/6	8/3/96 14:14:08.5- 14:14:15.7	134.5M	7.2	1975672.1	240001.1	29.32676739	91.4095329	36.0	
M952	5/6	8/3/96 14:14:50.3- 14:15:47.3	134.5M	57.0	1976009.6	240571.2	29.32830878	91.4084452	47.3	
M953	5/6	8/3/96 14:16:29.5- 14:16:32.2	29.0-	2.7	1976412.1	240986.2	29.32948846	91.4072282	30.7	
M954	5/6	8/3/96 14:25:06.6- 14:25:09.9	23.0+	3.3	1979177.3	244600.0	29.33941521	91.3985348	38.4	
M955	5/6	8/3/96 14:30:07.0- 14:30:11.4	41.0D	4.4	1980841.9	246717.5	29.34527643	91.3933768	18.6	
M956	5/7	8/3/96 14:53:18.9- 14:53:22.2	715.5+	3.3	1976713.9	241250.1	29.2989957	91.4065252	208.4	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M957	5/7	8/3/96 14:53:37.0- 14:53:48.9	48.0M	11.9	1976610.5	241092.3	29.32945405	91.4068264	201.5	A162
M958	5/7	8/3/96 14:56:31.2- 14:56:35.6	327.5D	4.4	1975843.8	240047.7	29.32659125	91.4092529	208.3	
M959	5/7	8/3/96 15:05:37.2- 15:05:45.9	375.5M	8.7	1973255.5	236700.5	29.31740167	91.4173967	218.2	
M960	5/7	8/3/96 15:10:16.3- 15:12:19.1	60.5M	122.8	1971663.1	234624.0	29.31169943	91.4224011	223.1	
M961	5/8	8/3/96 15:32:31.2- 15:32:47.6	718.5M	16.4	1973028.0	236077.3	29.31596790	91.4178154	37.8	
M962	5/8	8/3/96 15:34:37.5- 15:34:43.5	45.0-	6.0	1973507.9	236910.5	29.31822222	91.4162750	52.8	
M963	5/8	8/3/96 15:41:02.6- 15:41:05.9	29.5-	3.3	1975604.2	239451.6	29.32525588	91.4097441	36.1	
M964	5/8	8/3/96 15:52:40.2- 15:52:47.9	173.0D	7.7	1979448.2	244401.7	29.33884323	91.3976568	49.3	
M965	5/9	8/3/96 16:22:01.6- 16:22:11.9	313.0D	10.3	1977346.5	241463.7	29.33048984	91.4045435	209.4	
M966	5/9	8/3/96 16:33:40.8- 16:33:43.5	67.0+	2.7	1974131.2	237244.9	29.31890773	91.4146589	221.4	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M967	5/10	8/4/96 08:39:26.8- 08:39:34.5	206.0D	7.7	1973109.7	235903.8	29.31518877	91.4178204	207.6	
M968	5/10	8/4/96 08:43:43.2- 08:43:47.6	104.5+	4.4	1971859.1	234177.4	29.31047883	91.4217923	226.0	
M969	5/11	8/4/96 09:39:12.1- 09:41:39.6	49.308.0M	147.5	1978824.9	242807.5	29.33422533	91.3999537	226.2	
M970	5/11	8/4/96 09:45:26.0- 09:45:32.0	31.5-	6.0	1977230.2	240771.0	29.32860918	91.4049408	221.0	
M971	5/11	8/4/96 09:48:42.8- 09:48:45.6	31.5+	2.8	1976134.7	239418.1	29.32487370	91.4083596	215.1	
M972	5/11	8/4/96 09:57:20.4- 09:57:27.5	115.5-	7.1	1973336.3	235727.7	29.31471901	91.4171310	214.7	
M973	5/11	8/4/96 10:00:33.9- 10:00:41.1	29.5D	7.2	1972242.9	234356.2	29.31096621	91.4205838	224.0	
M974	5/11	8/4/96 10:03:36.5- 10:03:54.7	24.0M	18.2	1971122.3	233033.2	29.30730098	91.4240660	213.0	
M975	5/11	8/4/96 10:04:26.0- 10:05:41.2	28.5M	75.2	1970786.9	232538.9	29.30595163	91.4251317	218.1	
M976	5/12	8/4/96 11:33:03.6- 11:33:08.0	55.0+	4.4	1972331.9	234259.7	29.31069049	91.4202928	219.6	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M977	5/12	8/4/96 11:35:24.6- 11:35:27.3	88.5+	2.7	1971597.3	233231.8	29.30789062	91.4226224	230.8	
M978	5/13	8/4/96 10:14:32.0- 10:14:39.7	180.5-	7.7	1972465.1	234136.1	29.31080970	91.4195570	45.6	
M979	5/13	8/4/96 10:29:22.1- 10:29:36.8	43.0+	14.7	1977012.4	239970.1	29.32667181	91.4053115	41.5	
M980	5/13	8/4/96 10:30:27.9- 10:30:36.7	61.0-	8.8	1977297.8	240372.4	29.32781335	91.4044683	24.3	
M981	5/13	8/4/96 10:36:15.7- 10:36:20.5	409.0-	4.8	1978956.2	242504.0	29.33363867	91.3992113	43.5	
M982	5/14	8/4/96 09:10:45.2- 09:10:57.3	196.0-	12.1	1977080.2	239719.5	29.32597760	91.4050927	43.7	
M983	5/14	8/4/96 09:11:51.1- 09:11:55.5	28.0-	4.4	1977380.6	240164.6	29.32721924	91.4041705	36.4	
M984	5/14	8/4/96 09:22:37.6- 09:22:42.1	214.5-	4.5	1980894.7	244700.2	29.33969232	91.3931440	38.8	
M985	5/15	8/3/96 18:38:04.8- 18:38:09.2	30.5+	4.4	1974060.0	235619.9	29.31472241	91.4145906	33.0	
M986	5/15	8/3/96 18:40:12.5- 18:40:21.3	49.5-	8.8	1974748.3	236553.6	29.31730857	91.4124638	23.3	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M987	5/15	8/3/96 18:56:06.3- 18:56:15.6	332.5+	9.3	1979950.0	243246.8	29.33567786	91.3960888	45.5	
M988	5/15	8/3/96 18:56:29.3- 18:56:33.6	158.5-	4.3	1980058.6	243380.4	29.33605668	91.3957600	40.9	
M989	5/15	8/3/96 18:58:08.0- 18:58:11.3	65.5+	3.3	1980612.8	244031.6	29.33785039	91.3940244	40.0	
M990	5/15	8/3/96 19:00:02.2- 19:00:06.6	33.0D	4.4	1981208.9	244811.7	29.34002969	91.3922068	23.0	
M991	5/16	8/3/96 17:43:01.7- 17:43:09.4	42.0D	7.7	1981588.5	245074.8	29.34045000	91.3912695	220.3	
M992	5/16	8/3/96 17:51:34.4- 17:51:48.2	50.5M	13.8	1979810.7	242658.6	29.33393048	91.3969086	263.3	
M993	5/16	8/3/96 18:03:13.7- 18:03:24.2	52.0M	10.5	1976728.1	238760.7	29.32314785	91.4065616	245.3	
M994	5/16	8/3/96 18:09:33.3- 18:09:48.1	39.0M	14.8	1975114.2	236647.6	29.31732726	91.4116182	243.2	
M995	5/16	8/3/96 18:20:42.3- 18:21:24.5	52.5M	42.2	1971991.4	232646.7	29.30628261	91.4213848	230.8	
M996	5/16	8/3/96 18:22:58.8- 18:23:35.1	46.0M	36.3	1971374.4	231860.6	29.30420000	91.4233548	257.1	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (LA STATE PLANE [SOUTH] NAD-27 [FT])	Y (LA STATE PLANE [SOUTH] NAD-27 [FT])	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
M997	5/17	8/3/96 17:05:59.4- 17:07:00.5	39.5+	61.1	1973540.3	234472.9	29.31151055	91.4161622	55.7	
M998	n/a	NOT AN ANOMALY	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
M999	5/17	8/3/96 17:15:58.4- 17:16:01.7	21.0+	3.3	1976608.1	238491.0	29.32263855	91.4066294	24.2	
M100	5/17	8/3/96 17:24:16.3- 17:24:22.4	17.5D	6.1	1979527.8	242184.1	29.33275648	91.3974136	44.8	
M1001	5/17	8/3/96 17:31:36.2- 17:31:41.8	15.0+	5.6	1982078.6	245442.4	29.34173786	91.3895333	37.5	
M1002	5/17	8/3/96 17:34:10.5- 17:34:28.3	19.4M	17.8	1982872.0	246621.0	29.34496274	91.3869254	44.8	

APPENDIX V

INVENTORIES OF ACOUSTIC ANOMALIES DISCOVERED IN THE RESURVEYED AREAS

INVENTORY OF ACOUSTIC ANOMALIES FROM ATCHAFALAYA ODMDS RESURVEY AREAS

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE	LONGITUDE	CORRELATIONS
RA1	2B/7	8/5/96 11:40:35	oblong anomaly	134.2 ft port	29°11.590N	91°32.289W	
RA2	2D/7	8/5/96 12:53:46	25 ft diameter round anomaly	41.5 ft port	29°11.383N	91°31.805W	
RA3	2D/7	8/5/96 12:53:46	30 ft wide oblong anomaly	67.45 ft starboard	29°11.383N	91°31.805W	
RA4	2D/7	8/5/96 12:54:12	20 ft wide linear anomaly oriented perpendicular to centerline	36.8 ft port	29°11.419N	91°31.818W	
RA5	2D/7	8/5/96 12:54:18	40 ft wide linear anomaly oriented perpendicular to centerline	36.8 ft port	29°11.424N	91°31.817W	
RA6	2D/7	8/5/96 12:54:45	40 ft wide oblong anomaly	36.8 ft port	29°11.444N	91°31.813W	RM98
RA7	3B/6	8/5/96 16:27:48	(2) faint parallel linear anomalies oriented diagonally across centerline	61.5 ft port- 55.7 ft starboard	29°13.795N	91°29.745W	RB20, RB21, RM144, RM145
RA8	3C/6	8/5/96 17:19:05- 17:20:08	curvilinear acoustic disturbance across centerline (probable geological formation)	across entire traverse port-starboard	29°13.721N	91°29.476W	
RA9	3D/2	8/5/96 17:58:49	(2) adjacent oblong anomalies	37.4 ft port	29°14.795N	91°28.651W	RM165
RA10	3D/4	8/5/96 18:28:25	linear anomaly	0.0-79.6 ft port	29°14.822N	91°28.642W	RM167

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	OFFSET (port/starboard)	LATITUDE	LONGITUDE	CORRELATIONS
RA11	3D/10	8/5/96 18:13:22- 18:14:13	long linear anomaly (possible gas pipeline)	51.0 ft starboard - limit of starboard channel	29°14.770N	91°28.583W	
RA12	5B/2	8/4/96 16:37:07	pronounced 20 ft long linear anomaly	42.1 ft port	29°20.33N	91°23.958W	
RA13	5C/2	8/4/96 13:26:06	multiple adjacent scour-like linear depressions (probable scour)	across entire traverse port-starboard	29°18.711N	91°25.389W	RM262

APPENDIX VI

INVENTORIES OF BATHYMETRIC ANOMALIES DISCOVERED IN THE RESURVEYED AREAS

**INVENTORY OF BATHYMETRIC ANOMALIES AT ATCHAFALAYA ODMDS
RESURVEYED AREAS**

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	X (NAD 1927)	X (NAD 1927)	LATITUDE	LONGITUDE	CORRELATIONS
RB1	1A/3	8/5/96 08:47:50.1	2-3 ft tall plateau surrounded by 1-2 ft tall/deep peaks/depressions	1924682.9	173014.4	29.14218633	91.5708167	RM3
RB2	1A/5	8/5/96 09:10:31.0	4-5 ft tall plateau	1924238.7	172933.8	29.14196497	91.5706412	RM5
RB3	1A/5	8/5/96 09:10:15.6	8 ft tall peak	1924254.2	173070.1	29.14234080	91.5705975	RM5
RB4	1A/9	8/5/96 08:55:46.7	71.72 ft deep depression (malfunction)	1924481.0	172847.0	29.14178844	91.5698739	RM9
RB5	1A/12	8/5/96 09:13:35.5	3-4 ft deep flat-bottomed depression	1924612.1	173226.7	29.14283294	91.5694624	RM13
RB6	1B/3	8/5/96 09:40:40.8	5-6 ft tall plateau with 3 ft deep depression on one side	1924876.7	173844.0	29.14447451	91.5686585	RM17
RB7	1B/4	8/5/96 09:47:01.8	3 ft deep flat-bottomed depression	1924951.9	173581.3	29.14374371	91.5683998	RM18
RB8	1C/11	8/5/96 10:44:49.0	3-4 ft tall plateau	1929982.6	180169.7	29.16195534	91.5526833	
RB9	1C/11	8/5/96 10:45:58.1	3 ft deep depression	1929969.2	180739.4	29.16352214	91.5527361	
RB10	2A/13	8/5/96 15:16:14.1	1 ft tall peak adjacent to a 2-3 ft deep depression	1940742.1	195179.6	29.20328418	91.5190500	RM66
RB11	2D/5	8/5/96 13:00:01.0	3-4 ft tall peak adjacent to 2-3 ft deep depression	1937107.6	190665.9	29.19085518	91.5304184	

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	X (NAD 1927)	X (NAD 1927)	LATITUDE	LONGITUDE	CORRELATIONS
RB12	2D/6	8/5/96 13:12:42.0- 13:13:02.4	multilevel depression (5 ft max depth)	1937144.6	190604.2	29.19068542	91.5303000	RM97
RB13	2D/10	8/5/96 13:29:42.1- 13:29:48.5	convoluted bottom surface over entire transect with 1-2 ft tall/deep peaks/depressions	1937312.1	190654.2	29.19082383	91.5297869	
RB14	2D/13	8/5/96	obvious malfunction - fathometer reading depths 10- 360 ft deep	n/a	n/a	n/a	n/a	
RB15	3A/3	8/1/96 14:45:33.2	5 ft deep depression surrounded by 2-3 ft tall peaks	1946245.1	204095.1	29.22782298	91.5018167	
RB16	3A/4	8/1/96 14:24:01.5- 14:24:02.6	4-5 ft tall plateau surrounded by 2-3 ft deep depressions	1946266.8	203551.1	29.22629657	91.5017333	RM111
RB17	3A/5	8/1/96 14:07:50.2- 14:07:55.3	5 ft tall plateau surrounded by 1 ft deep depressions	1946325.5	203539.2	29.22627406	91.5015500	
RB18	3A/5	8/1/96 14:07:18.8	10 ft deep depression surrounded by 2-3 ft tall peaks	1946315.9	203847.8	29.22712877	91.5015833	RM113
RB19	3A/11	8/1/96 14:33:53.4	6-7 ft tall peak	1946654.9	203832.5	29.22704980	91.5005999	RM127
RB20	3B/6	8/5/96 16:27:25.4	4-5 ft deep depression	1946184.7	204667.9	29.22940749	91.4957803	RA7, RM144, RM145
RB21	3B/6	8/5/96 16:27:29.2	4-5 ft deep depression	1946173.4	204706.0	29.22951302	91.4958116	RA7, RM144, RM145
RB22	4B/2	8/1/96 13:02:18.9	10 ft deep depression	1959839.0	217960.4	29.26599246	91.4592419	
RB23	4B/6	8/1/96 13:10:38.8	12-13 ft deep depression	1960081.9	217791.0	29.26551168	91.4584739	

ANOM. #	AREA/ LINE	DATE/ TIME	DESCRIPTION	X (NAD 1927)	X (NAD 1927)	LATITUDE	LONGITUDE	CORRELATIONS
RB24	5A/9	8/4/96 14:25:59.9	3-4 ft deep depression	1974432.9	239496.6	29.32526302	91.4135551	RM232

APPENDIX VII

INVENTORIES OF MAGNETIC ANOMALIES DISCOVERED IN THE RESURVEYED AREAS

INVENTORY OF MAGNETIC ANOMALIES AT ATCHAFALAYA ODMDS RESURVEY AREAS

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM1	1A/1	8/5/96 08:52:24.0- 08:53:48.3	28.5M	84.3	1924028.5	173075.1	29.14202757	91.5712833	176.1	
RM2	1A/2	8/5/96 08:58:36.4- 08:59:52.7	64.5M	76.3	1924113.9	173081.6	29.14204745	91.5710667	183.3	
RM3	1A/3	8/5/96 08:47:10.7- 08:48:33.0	40.5M	82.3	1924181.5	173081.5	29.14204608	91.5708000	175.5	RB1
RM4	1A/4	8/5/96 09:04:34.8- 09:05:49.9	42.5M	75.1	1924205.5	173099.7	29.14209617	91.5707513	179.2	
RM5	1A/5	8/5/96 09:09:48.4- 09:11:04.8	33.0M	76.4	1924254.5	173087.3	29.14206455	91.5706333	184.3	RB2, RB3
RM6	1A/6	8/5/96 09:15:24.7- 09:16:39.2	44.5M	74.4	1924308.1	173066.8	29.14200719	91.5704500	182.1	
RM7	1A/7	8/5/96 09:20:52.9- 09:22:09.1	53.5M	76.2	1924349.0	173092.0	29.14207656	91.5703184	181.6	
RM8	1A/8	8/5/96 08:49:55.9- 08:51:07.8	39.5M	71.9	1924405.1	173007.9	29.14255376	91.5700833	2.1	
RM9	1A/9	8/5/96 08:55:34.7- 08:56:22.5	38.5M	47.8	1924466.7	172713.4	29.14174238	91.5698667	5.2	RB4

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM10	1A/9	8/5/96 08:56:45.0- 08:56:49.5	21.5D	4.5	1924431.8	173313.7	29.14337989	91.5699123	15.0	
RM11	1A/10	8/5/96 09:02:06.2- 09:02:46.6	36.5M	40.4	1924474.3	173229.7	29.14316068	91.5698348	6.8	
RM12	1A/11	8/5/96 09:07:24.2- 09:08:43.7	34.0M	79.5	1924559.8	172969.1	29.14244072	91.5697167	345.3	
RM13	1A/12	8/5/96 09:12:42.4- 09:13:58.6	43.5M	76.2	1924571.2	172992.2	29.14250755	91.5695253	7.5	RB5
RM14	1A/13	8/5/96 09:18:51.6- 09:19:23.0	42.5M	31.4	1924629.3	173167.3	29.14299339	91.5693800	2.4	
RM15	1B/1	8/5/96 09:28:26.9- 09:29:45.0	40.0M	78.1	1924848.8	173645.9	29.14360726	91.5688000	187.8	
RM16	1B/2	8/5/96 09:34:30.0- 09:35:46.5	47.0M	76.5	1924874.3	173643.4	29.14359531	91.5686667	180.2	
RM17	1B/3	8/5/96 09:40:30.2- 09:41:59.8	41.0M	89.6	1924896.9	173666.0	29.14366318	91.5685044	167.2	RB6
RM18	1B/4	8/5/96 09:46:22.6- 09:47:49.4	21.0M	86.8	1924922.6	173627.9	29.14359042	91.5683158	151.0	RB7
RM19	1B/5	8/5/96 09:53:51.0- 09:55:15.1	52.5M	84.1	1925044.3	173671.8	29.14367448	91.5681333	180.1	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM20	1B/6	8/5/96 10:00:03.1- 10:01:31.9	63.5M	88.8	1925092.7	173667.0	29.14366400	91.5680167	185.0	
RM21	1B/7	8/5/96 10:03:22.8- 10:04:46.6	81.0M	83.8	1925147.5	173538.8	29.14401901	91.5677822	359.1	
RM22	1B/8	8/5/96 09:31:43.6- 09:33:06.0	34.0M	82.4	1925235.5	173623.6	29.14425091	91.5675586	351.8	
RM23	1B/9	8/5/96 09:25:43.3- 09:26:38.7	40.0M	76.7	1925250.2	173604.6	29.14419668	91.5675317	349.1	
RM24	1B/10	8/5/96 09:37:40.7- 09:39:21.1	23.0M	100.4	1925241.3	173666.6	29.14436618	91.5674335	7.0	
RM25	1B/11	8/5/96 09:43:18.2- 09:44:38.9	26.5M	80.7	1925320.5	173562.4	29.14408447	91.5672718	354.7	
RM26	1B/12	8/5/96 09:50:40.5- 09:51:54.1	19.0M	73.6	1925402.9	173472.4	29.14381712	91.5671279	338.0	
RM27	1B/13	8/5/96 09:56:58.8- 09:58:28.7	48.0M	89.9	1925412.7	173594.8	29.14417441	91.5669500	359.4	
RM28	1C/1	8/5/96 10:24:44.6- 10:26:09.0	56.5M	84.4	1929482.6	180433.4	29.16229645	91.55431617	186.4	
RM29	1C/2	8/5/96 10:30:34.7- 10:31:56.9	27.5M	82.2	1929522.1	180461.5	29.16237625	91.5542079	188.5	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM30	1C/3	8/5/96 10:36:14.7- 10:37:37.4	54.5M	82.7	1929553.1	180457.4	29.16235898	91.5540333	177.5	
RM31	1C/4	8/5/96 10:42:00.2- 10:43:22.5	51.0M	82.3	1929599.7	180463.6	29.16237637	91.5538965	178.8	
RM32	1C/5	8/5/96 10:47:53.9- 10:49:21.2	36.0M	87.3	1929646.9	180420.7	29.16225863	91.5537500	179.0	
RM33	1C/6	8/5/96 10:53:54.2- 10:55:19.8	43.0M	85.6	1929693.9	180449.7	29.16233929	91.5535667	173.9	
RM34	1C/7	8/5/96 10:20:16.4- 10:20:53.7	26.5M	37.3	1929129.0	180496.1	29.16317484	91.5532138	351.5	
RM35	1C/8	8/5/96 10:28:28.3- 10:28:34.4	28.5-	6.0	1929813.0	180401.1	29.16291563	91.5532167	358.2	
RM36	1C/8	8/5/96 10:28:46.5- 10:29:05.7	26.5M	13.5	1929798.1	180600.8	29.16345739	91.5531864	9.3	
RM37	1C/9	8/5/96 10:33:24.1- 10:34:50.8	24.0M	86.7	1929821.9	180328.6	29.16271253	91.5531333	6.0	
RM38	1C/10	8/5/96 10:39:07.3- 10:39:19.3	22.5M	12.0	1929921.0	180133.3	29.16217979	91.5528833	357.2	
RM39	1C/10	8/5/96 10:39:29.7- 10:39:35.8	12.5-	6.1	1929905.1	180281.7	29.16258742	91.5529167	359.7	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM40	1C/11	8/5/96 10:45:46.5- 10:45:52.5	13.5D	6.0	1929944.2	180550.6	29.16331781	91.5527167	11.0	
RM41	1C/12	8/5/96 10:51:31.6- 10:51:46.4	9.5M	14.8	1930018.9	180315.3	29.16267839	91.5526206	351.1	
RM42	1C/12	8/5/96 10:52:01.7- 10:52:22.6	11.5M	20.9	1929990.3	180613.5	29.16349935	91.5526333	2.3	
RM43	1C/13	8/5/96 10:57:30.0- 10:57:33.3	21.0+	3.3	1930035.0	180279.6	29.16257708	91.5524521	7.9	
RM44	1C/13	8/5/96 10:58:04.4- 10:58:18.1	19.0M	14.1	1930081.1	180595.7	29.16344847	91.5524384	349.6	
RM45	2A/1	8/5/96 14:23:08.7- 14:23:53.6	22.0M	44.9	1940067.1	195212.1	29.20368001	91.5210533	14.6	
RM46	2A/1	8/5/96 14:24:10.1- 14:24:14.5	16.5+	31.4	1940131.9	195573.0	29.20468685	91.5209333	2.9	
RM47	2A/2	8/5/96 14:12:29.2- 14:12:35.2	42.5-	6.0	1940158.5	195787.7	29.20456999	91.5208517	172.5	
RM48	2A/2	8/5/96 14:12:50.5- 14:13:03.7	45.0M	13.2	1940179.2	195618.2	29.20410273	91.5208167	176.9	
RM49	2A/3	8/5/96 14:28:37.1- 14:29:17.6	34.5M	40.5	1940221.0	195109.2	29.20341283	91.5206667	0.8	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM50	2A/4	8/5/96 14:55:02.4- 14:55:17.9	26.0M	15.5	1940246.0	195594.0	29.20403649	91.5206066	176.8	
RM51	2A/4	8/5/96 14:56:05.5- 14:56:10.5	59.5D	5.0	1940294.1	195116.0	29.20272562	91.5205167	185.8	
RM52	2A/5	8/5/96 14:05:25.2- 14:05:46.1	17.5M	20.9	1940262.0	195836.2	29.20474811	91.5203657	148.3	
RM53	2A/6	8/5/96 14:35:19.2- 14:35:21.9	21.5+	2.7	1940373.8	195222.7	29.20371647	91.5201167	11.0	
RM54	2A/6	8/5/96 14:36:07.0- 14:36:27.8	39.0M	20.8	1940396.4	195730.4	29.20512214	91.5201333	358.9	
RM55	2A/7	8/5/96 14:41:54.9- 14:42:05.4	16.5M	10.5	1940466.0	195011.1	29.20313525	91.5200118	344.6	
RM56	2A/7	8/5/96 14:42:17.5- 14:42:35.6	19.5M	18.1	1940418.7	195243.4	29.20377161	91.5199667	12.4	
RM57	2A/7	8/5/96 14:42:44.4- 14:42:50.4	16.5D	6.0	1940457.9	195441.9	29.20432119	91.5200333	345.4	
RM58	2A/7	8/5/96 14:43:25.1- 14:43:27.9	18.0-	2.8	1940459.5	195769.7	2920523079	91.5199500	356.8	
RM59	2A/8	8/5/96 14:17:13.0- 14:17:33.8	13.5M	20.8	1940495.5	195678.4	29.20497682	91.5198833	350.2	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM60	2A/9	8/5/96 14:49:29.6- 14:50:23.4	26.0M	53.8	1940509.1	195204.2	29.20367135	91.5198500	348.6	
RM61	2A/9	8/5/96 14:50:53.7- 14:51:04.1	46.0M	10.4	1940524.3	195755.2	29.20519378	91.5197333	358.8	
RM62	2A/10	8/5/96 14:09:03.9- 14:09:23.7	18.0M	19.8	1940586.9	195115.3	29.20343171	91.5195333	358.8	
RM63	2A/10	8/5/96 14:09:53.3- 14:10:32.2	21.5M	38.9	1940596.4	195588.2	29.20472917	91.5195667	350.3	
RM64	2A/11	8/5/96 15:09:49.4- 15:10:34.2	28.5M	44.8	1940619.0	195363.1	29.20411136	91.5194000	3.7	
RM65	2A/12	8/5/96 14:45:46.1- 14:47:40.3	59.0M	114.2	1940699.4	195484.3	29.20373867	91.5192333	183.6	
RM66	2A/13	8/5/96 15:16:53.6- 15:16:58.0	63.0-	4.4	1940686.1	195454.9	29.20435469	91.5191318	12.1	RB10
RM67	2A/13	8/5/96 15:17:07.3- 15:17:11.6	32.5D	4.3	1940724.4	195575.4	29.20467904	91.5189848	16.2	
RM68	2A/14	8/5/96 15:06:28.2- 15:07:16.3	28.0M	48.1	1940774.5	195271.5	29.20315208	91.5189667	179.4	
RM69	2A/15	8/5/96 14:03:16.0- 14:03:35.3	27.0M	19.3	1940800.9	195565.5	29.20466217	91.5187848	10.3 -	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM70	2B/1	8/5/96 11:49:13.3- 11:49:56.7	92.5M	43.4	1934335.4	188327.6	29.18402604	91.5391000	178.1	
RM71	2B/2	8/5/96 11:54:25.4- 11:55:46.2	36.0M	80.8	1934391.1	188386.2	29.18419004	91.5389700	184.4	
RM72	2B/3	8/5/96 11:59:25.2- 12:00:46.3	37.5M	81.1	1934452.5	188381.7	29.18418730	91.5388333	192.5	
RM73	2B/4	8/5/96 12:21:07.3- 21:21:17.7	14.5M	10.4	1934433.4	188159.5	29.18427435	91.5387970	356.5	
RM74	2B/4	8/5/96 12:21:29.8- 12:21:45.1	27.0M	15.3	1934493.2	188327.6	29.18473464	91.5386500	350.8	
RM75	2B/5	8/5/96 12:26:07.5- 12:26:24.1	29.5M	16.6	1934550.9	188147.8	29.18423867	91.5384833	348.7	
RM76	2B/5	8/5/96 12:26:46.5- 12:26:59.7	15.5M	13.2	1934532.8	188444.3	29.18505820	91.5384833	357.0	
RM77	2B/6	8/5/96 12:33:11.8- 12:34:40.3	47.0M	88.5	1934563.2	188265.4	29.18455618	91.5384781	344.0	
RM78	2B/7	8/5/96 11:46:05.5- 11:46:44.5	46.0M	39.0	1934598.2	188166.9	29.18428685	91.5381833	10.4	
RM79	2B/8	8/5/96 11:51:35.9- 11:51:56.8	44.5M	20.9	1934708.1	187989.2	29.18380286	91.5379931	348.2	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM80	2B/8	8/5/96 11:52:25.2- 11:52:29.6	12.5-	4.4	1934657.3	188357.4	29.18481813	91.5380500	3.1	
RM81	2B/9	8/5/96 11:57:11.9- 11:57:20.8	39.0M	8.9	1934754.3	188140.4	29.18420703	91.5379047	340.1	
RM82	2B/9	8/5/96 11:58:05.7- 11:58:11.8	15.0D	6.1	1934729.5	188525.2	29.18527939	91.5378167	4.2	
RM83	2B/10	8/5/96 12:02:37.6- 12:02:44.7	34.5D	7.1	1934794.4	188158.6	29.18427383	91.5376619	357.0	
RM84	2B/10	8/5/96 12:03:16.4- 12:03:25.2	14.0M	8.8	1934742.2	188484.0	29.18516029	91.5377365	10.0	
RM85	2B/11	8/5/96 12:06:14.9- 12:07:14.6	16.5M	59.7	1934752.9	188120.1	29.18411263	91.5375707	30.0	
RM86	2B/11	8/5/96 12:07:36.0- 12:07:50.9	31.0M	14.9	1934779.6	188589.8	29.18544727	91.5376009	12.7	
RM87	2B/12	8/5/96 12:11:26.9- 12:11:34.6	32.5D	7.7	1934906.3	188018.7	29.18387546	91.5374196	341.4	
RM88	2B/12	8/5/96 12:11:46.1- 12:11:51.1	28.0+	5.0	1934858.1	188160.0	29.18427430	91.5374000	5.9	
RM89	2B/12	8/5/96 12:12:40.1- 12:12:46.1	29.0D	6.0	1934895.0	188610.4	29.18548965	91.5375000	331.1	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM90	2B/13	8/5/96 12:15:17.7- 12:15:37.1	16.0M	19.4	1934996.6	187965.4	29.18370000	91.5372167	329.0	
RM91	2B/13	8/5/96 12:15:55.6- 12:16:46.6	51.0M	51.0	1934914.6	188346.6	29.18478447	91.5373615	346.3	
RM92	2D/1	8/5/96 12:42:05.3- 12:43:04.1	47.5M	58.8	1936875.9	190680.0	29.19120687	91.5310500	11.8	
RM93	2D/2	8/5/96 12:47:02.5- 12:47:06.9	11.0D	4.4	1936918.9	190262.1	29.19002054	91.5308085	27.8	
RM94	2D/2	8/5/96 12:47:32.7- 12:48:17.8	43.0M	45.1	1936979.2	190702.3	29.19127135	91.5309107	345.5	
RM95	2D/3	8/5/96 12:56:43.1- 12:58:17.8	50.5M	94.7	1936921.9	190549.8	29.19017708	91.5308479	155.0	
RM96	2D/4	8/5/96 13:06:05.6- 13:07:29.9	48.0M	84.3	1937054.1	190478.8	29.19066504	91.5305783	359.2	
RM97	2D/6	8/5/96 13:12:03.0- 13:13:19.2	41.5M	76.2	1937133.0	190461.0	29.19061505	91.5303046	2.9	RB12
RM98	2D/7	8/5/96 12:54:35.7- 12:55:05.4	39.0M	29.7	1937217.4	190677.7	29.19121237	91.5301000	354.6	RA6
RM99	2D/8	8/5/96 13:17:04.4- 13:18:32.8	53.5M	88.4	1937268.3	190453.9	29.19059661	91.5299500	353.1	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM100	2D/9	8/5/96 13:23:53.6- 13:24:29.9	42.0M	36.3	1937317.4	190681.8	29.19122367	91.5297333	2.2	
RM101	2D/10	8/5/96 13:29:46.4- 13:29:49.1	22.0+	2.7	1937325.2	190575.8	29.19092529	91.5298251	345.5	
RM102	2D/11	8/5/96 13:34:43.2- 13:34:46.5	22.0+	3.3	1937380.0	190097.0	29.18961217	91.5295000	7.0	
RM103	2D/12	8/5/96 13:40:56.7- 13:41:10.3	33.5M	13.6	1937493.3	190722.4	29.19132819	91.5293038	344.8	
RM104	3A/1	8/1/96 14:57:48.9- 14:57:51.7	13.0-	2.8	1946169.4	203484.8	29.22659020	-91.5022245	347.3	
RM105	3A/1	8/1/96 14:58:09.7- 14:58:54.6	28.0M	44.9	1946184.7	203809.8	29.22749521	-91.5021151	353.9	
RM106	3A/2	8/1/96 14:37:49.1- 14:39:12.8	32.5M	83.7	1946205.7	203952.5	29.22691589	-91.5020336	188.1	
RM107	3A/3	8/1/96 14:46:00.6- 14:46:11.1	40.5M	10.5	1946307.1	204001.9	29.22706598	-91.5018002	196.9	
RM108	3A/4	8/1/96 14:22:53.1- 14:23:06.9	30.0M	13.8	1946248.5	204234.5	29.22771393	-91.5016618	163.3	
RM109	3A/4	8/1/96 14:23:19.0- 14:23:33.9	26.0M	14.9	1946330.0	204027.8	29.22712135	-91.5016167	185.3	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM110	3A/4	8/1/96 14:23:48.6- 14:23:57.9	26.0M	9.3	1946293.7	203800.0	29.22649437	-91.5017167	184.0	
RM111	3A/4	8/1/96 14:24:11.1- 14:24:14.4	15.0-	3.3	1946277.1	203632.3	29.22603257	-91.5017500	182.1	RB16
RM112	3A/5	8/1/96 14:07:03.9- 14:07:06.6	38.0+	2.7	1946312.1	204150.7	29.22745879	-91.5016167	179.5	
RM113	3A/5	8/1/96 14:07:17.1- 14:07:23.1	26.5D	6.0	1946294.1	204013.1	29.22709004	-91.5015833	170.3	RB18
RM114	3A/6	8/1/96 14:14:56.5- 14:15:15.7	177.5M	19.2	1946321.3	204145.6	29.22746934	-91.5014347	163.4	
RM115	3A/6	8/1/96 14:15:21.7- 14:15:35.5	91.0M	13.8	1946393.6	203924.3	29.22683815	-91.5013333	176.7	
RM116	3A/7	8/1/96 14:30:03.9- 14:30:08.3	25.5+	4.4	1946466.0	204286.1	29.22783590	-91.5012333	189.6	
RM117	3A/7	8/1/96 14:30:34.0- 14:30:36.8	28.5+	2.8	1946391.1	204057.7	29.22720732	-91.5013167	174.1	
RM118	3A/7	8/1/96 14:30:45.6- 14:30:54.9	56.5-	9.3	1946404.7	203933.6	29.22687572	-91.5012167	168.2	
RM119	3A/7	8/1/96 14:30:56.5- 14:31:03.6	131.0M	7.1	1946415.5	203840.6	29.22662292	-91.5011688	166.8	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM120	3A/8	8/5/96 15:46:02.5- 15:46:13.3	49.0M	10.8	1946480.1	203824.5	29.22740599	-91.5010833	1.6	
RM121	3A/8	8/5/96 15:46:34.1- 15:46:40.1	18.0M	6.0	1946450.3	204144.7	29.22827275	-91.5010924	14.0	
RM122	3A/9	8/1/96 14:42:05.2- 14:42:08.5	16.5+	3.3	1946592.8	203529.8	29.22672286	-91.5008614	351.1	
RM123	3A/9	8/1/96 14:42:37.0- 14:42:39.8	24.0-	2.8	1946505.2	203772.4	29.22739828	-91.5010313	355.6	
RM124	3A/9	8/1/96 14:43:09.9- 14:43:12.7	19.0+	2.8	1946505.1	204072.1	29.22820514	-91.5008872	17.2	
RM125	3A/10	8/1/96 14:26:42.7- 14:27:00.9	13.5M	18.2	1946519.7	203538.6	29.22671868	-91.5007740	24.2	
RM126	3A/10	8/1/96 14:27:14.0- 14:27:48.6	25.0M	34.6	1946679.5	203856.0	29.22759033	-91.5007041	338.9	
RM127	3A/11	8/1/96 14:33:56.3- 14:34:18.8	22.5M	22.5	1946660.6	203778.8	29.22739284	-91.5007167	344.0	RB19
RM128	3A/12	8/1/96 14:20:15.7- 14:20:29.4	45.5M	13.7	1946661.2	203893.4	29.22772865	-91.5004833	8.1	
RM129	3A/13	8/1/96 14:12:00.6- 14:12:22.0	41.0M	21.4	1946710.0	203845.1	29.22758857	-91.5002760	13.8	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM130	3B/1	8/5/96 15:58:10.4- 15:58:20.8	187.0D	10.4	1947954.7	205274.8	29.23070697	-91.4966167	195.0	
RM131	3B/1	8/5/96 15:58:46.1- 15:58:53.7	27.0M	7.6	1947980.7	205068.2	29.23013132	-91.4965010	190.2	
RM132	3B/1	8/5/96 15:59:17.8- 15:59:20.6	24.0-	2.8	1947976.9	204876.9	29.22960065	-91.4964833	186.1	
RM133	3B/1	8/5/96 15:59:38.7- 15:59:43.1	19.5+	4.4	1947943.4	204733.3	29.22920169	-91.4965342	178.5	
RM134	3B/2	8/5/96 16:07:08.8- 16:07:11.6	10.5-	2.8	1947969.1	204762.2	29.22998590	-91.4963769	7.8	
RM135	3B/2	8/5/96 16:07:22.5- 16:07:25.3	11.0-	2.8	1947996.5	204893.4	29.23034902	-91.4964167	350.0	
RM136	3B/2	8/5/96 16:07:26.9- 16:07:29.7	37.5+	2.8	1947969.1	204933.7	29.23046198	-91.4964167	2.2	
RM137	3B/3	8/5/96 16:11:37.3- 16:11:52.1	12.5M	14.8	1948002.1	204562.8	29.22941289	-91.4961803	21.5	
RM138	3B/4	8/5/96 16:16:55.6- 16:17:01.6	18.0M	6.0	1948081.8	204623.9	29.22960983	-91.4961333	352.1	
RM139	3B/4	8/5/96 16:17:08.7- 16:17:13.1	20.0D	4.4	1948083.9	204756.7	29.22997591	-91.4961167	353.6	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM140	3B/4	8/5/96 16:17:24.0- 16:17:56.9	37.0M	32.9	1948037.6	205010.0	29.23064953	-91.4960890	18.7	
RM141	3B/5	8/5/96 16:22:33.0- 16:22:45.0	46.0M	12.0	1948147.2	204712.0	29.22985015	-91.4959500	349.0	
RM142	3B/5	8/5/96 16:22:55.5- 16:22:58.2	12.5+	2.7	1948144.5	204874.1	29.23029967	-91.4958890	359.0	
RM143	3B/5	8/5/96 16:23:18.0- 16:23:31.2	38.5M	13.2	1948181.8	205123.8	29.23097369	-91.4958912	342.1	
RM144	3B/6	8/5/96 16:27:24.0- 16:27:32.8	19.5M	8.8	1948191.0	204600.4	29.22954271	-91.4958167	348.4	RA7, RB20, RB21
RM145	3B/6	8/5/96 16:27:44.8- 16:27:59.7	12.5M	14.9	1948171.4	204849.1	29.23022969	-91.4958500	352.6	RA7, RB20, RB21
RM146	3B/6	8/5/96 16:28:15.1- 16:28:28.2	34.0D	13.1	1948150.3	205148.7	29.23104346	-91.4957800	12.2	
RM147	3B/7	8/5/96 16:01:44.6- 16:01:50.7	71.0D	6.1	1948248.2	204575.8	29.22946094	-91.4957027	338.8	
RM148	3B/7	8/5/96 16:02:41.7- 16:02:46.1	26.0-	4.4	1948237.2	205096.3	29.23090944	-91.4955691	3.3	
RM149	3B/8	8/5/96 15:55:31.2- 15:55:43.3	539.0+	12.1	1948303.1	204896.1	29.23033971	-91.4955397	337.7	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM150	3B/8	8/5/96 15:55:49.4- 15:55:52.1	104.5+	2.7	1948241.8	204985.6	29.23060658	-91.4955833	359.2	
RM151	3B/9	8/5/96 16:33:07.3- 16:33:16.6	677.0-	9.3	1948310.3	204910.9	29.23039505	91.4953012	8.7	
RM152	3B/10	8/5/96 16:37:14.7- 16:38:27.2	38.5M	72.5	1948344.2	204862.2	29.23025384	91.4851598	13.8	
RM153	3B/11	8/5/96 16:43:34.6- 16:43:37.3	31.0-	2.7	1948405.5	204871.8	29.23028525	91.4949882	10.8	
RM154	3B/12	8/5/96 16:47:30.0- 16:48:03.0	30.0M	33.0	1948481.4	204720.3	29.22987799	91.4948500	356.5	
RM155	3B/13	8/5/96 16:51:58.5- 16:53:12.0	26.0M	73.5	1948476.0	204864.6	29.23026302	91.4947551	12.6	
RM156	3C/1	8/5/96 16:59:40.3- 17:00:38.5	26.5M	58.2	1949343.9	204894.0	29.22965101	91.4921823	183.8	
RM157	3C/2	8/5/96 17:04:43.0- 17:05:38.6	20.5M	55.6	1949393.1	204827.0	29.22946769	91.4920333	184.6	
RM158	3C/3	8/5/96 17:10:32.7- 17:10:49.1	12.0M	16.4	1949402.4	205044.0	29.23007035	91.4918667	164.9	
RM159	3C/3	8/5/96 17:11:35.9- 17:11:48.9	26.5M	13.0	1949408.4	204715.6	29.22916375	91.4918667	167.8	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM160	3C/5	8/5/96 17:12:58.1- 17:13:02.5	89.0+	4.4	1949516.4	204595.0	29.22953711	91.4916186	354.5	
RM161	3C/5	8/5/96 17:13:14.5- 17:13:26.6	317.0D	12.1	1949525.2	204781.5	29.23004938	91.4916000	353.4	
RM162	3C/6	8/5/96 17:19:56.4- 17:20:16.2	71.0M	19.8	1949552.7	204852.6	29.23023808	91.4913984	9.8	
RM163	3C/7	8/5/96 17:17:13.3- 17:17:26.5	3314.5D	13.2	1949630.4	204840.2	29.22950417	91.4912833	183.8	
RM164	3D/1	8/5/96 17:39:40.0- 17:41:07.1	50.5M	87.1	1953971.0	211160.4	29.24697480	91.4779085	216.0	
RM165	3D/2	8/5/96 17:57:58.1- 17:59:22.1	54.0M	84.0	1954050.9	211106.4	29.24676777	91.4775333	195.8	RA9
RM166	3D/3	8/5/96 17:51:47.6- 17:53:29.7	54.0M	102.1	1954072.2	211144.3	29.24685936	91.4774080	187.3	
RM167	3D/4	8/5/96 18:28:25.4- 18:28:28.1	14.0+	2.7	1954027.5	211036.9	29.24724138	91.4773230	20.5	RA10
RM168	3D/5	8/5/96 18:21:20.9- 18:21:27.0	30.0M	6.1	1954128.4	211107.6	29.24746374	91.4771500	359.6	
RM169	3D/6	8/5/96 18:00:41.8- 18:00:55.0	53.5M	13.2	1954193.4	210979.5	29.24711094	91.4769333	1.3	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM170	3D/7	8/5/96 17:35:29.7- 17:35:47.3	850.0M	17.6	1954239.5	211037.3	29.24726829	91.4767667	4.5	
RM171	3D/8	8/5/96 17:54:59.6- 17:55:04.0	22.0D	4.4	1954338.3	210702.1	29.24634307	91.4765810	346.7	
RM172	3D/8	8/5/96 17:55:24.9- 17:55:43.0	126.0M	18.1	1954310.3	211052.7	29.24731149	91.4766362	351.5	
RM173	3D/9	8/5/96 18:06:11.8- 18:06:34.2	355.5M	22.4	1954310.7	211055.4	29.24732018	91.4765667	1.2	
RM174	3D/10	8/5/96 17:43:41.6- 17:43:53.7	57.0M	12.1	1954402.7	210732.9	29.24643011	91.4763656	348.6	
RM175	3D/10	8/5/96 17:44:05.8- 17:44:37.0	52.0M	31.2	1954371.3	211158.1	29.24759538	91.4763167	9.9	
RM176	3D/11	8/5/96 18:24:00.0- 18:24:20.9	18.5M	20.9	1954483.1	211388.5	29.24753893	91.4761555	192.3	
RM177	3D/11	8/5/96 18:24:41.7- 18:24:45.0	21.5+	3.3	1954451.9	211138.9	29.24684076	91.4761500	177.7	
RM178	3D/12	8/5/96 18:17:08.7- 18:17:12.0	27.5-	3.3	1954509.1	211342.3	29.24740053	91.4759833	179.4	
RM179	3D/13	8/5/96 18:09:28.2- 18:11:10.1	30.0M	101.9	1954526.6	211119.5	29.24678835	91.4758942	174.7	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM180	4A/1	8/4/96 11:55:14.8- 11:55:18.1	200.5+	3.3	1969119.2	230212.9	29.29935124	-91.4300949	161.0	
RM181	4A/1	8/4/96 11:55:25.7- 11:55:30.1	28.0D	4.4	1969149.3	230136.3	29.29913203	-91.4300410	166.9	
RM182	4A/2	8/4/96 12:25:57.1- 12:26:12.0	16.0M	14.9	1969198.4	230467.2	29.30003688	-91.4299333	173.4	
RM183	4A/2	8/4/96 12:26:33.4- 12:26:37.7	21.0D	4.3	1969246.3	230155.5	29.29918040	-91.4298500	183.0	
RM184	4A/3	8/4/96 12:03:30.2- 12:03:32.9	5.0+	2.7	1969283.4	230535.9	29.30023333	-91.4297833	190.0	
RM185	4A/3	8/4/96 12:03:40.6- 12:03:45.0	8.5D	4.4	1969243.8	230436.9	29.29995749	-91.4297537	168.1	
RM186	4A/3	8/4/96 12:03:51.0- 12:04:12.4	7.0M	21.4	1969261.4	230297.1	29.29960202	-91.4295927	152.4	
RM187	4A/3	8/4/96 12:04:34.4- 12:04:37.7	7.0+	3.3	1969341.0	229984.3	29.29872884	-91.4296500	197.2	
RM188	4A/4	8/4/96 12:12:22.6- 12:12:27.0	138.0D	4.4	1969392.4	229822.5	29.29828398	-91.4292168	158.0	
RM189	4A/7	8/4/96 12:42:56.0- 12:43:25.8	30.5M	29.8	1969480.9	229982.3	29.29870501	-91.4291167	183.4	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM190	4A/8	8/4/96 11:58:40.8- 11:58:47.9	668.0D	7.1	1969564.3	230040.3	29.29957285	-91.4288114	357.9	
RM191	4A/8	8/4/96 11:59:04.8- 11:59:15.2	30.0M	10.4	1969534.9	230225.5	29.30007904	-91.4288521	5.3	
RM192	4A/9	8/4/96 12:07:51.8- 12:07:58.9	37.5-	7.1	1969578.5	230038.2	29.29956732	-91.4287670	358.0	
RM193	4A/10	8/4/96 12:22:48.0- 12:22:58.9	92.0M	10.9	1969631.3	230143.5	29.29985609	-91.4286333	353.5	
RM194	4A/11	8/4/96 12:20:13.8- 12:30:18.3	41.5+	4.5	1969679.4	229782.7	29.29886494	-91.4284550	357.2	
RM195	4A/12	8/4/96 12:46:24.5- 12:46:37.7	12.0M	13.2	1969717.3	229932.1	29.29927539	-91.4283500	355.3	
RM196	4A/12	8/4/96 12:46:53.1- 12:46:55.9	8.0-	2.8	1969729.5	230123.4	29.29980176	-91.4283006	356.9	
RM197	4A/13	8/4/96 12:39:26.0- 12:39:28.7	9.5+	2.7	1969765.4	230340.9	29.30039967	-91.4281667	0.0	
RM198	4A/14	8/4/96 12:15:19.9- 12:15:25.4	57.0+	5.5	1969789.0	230050.5	29.29960130	-91.4280940	359.7	
RM199	4A/14	8/4/96 12:15:34.8- 12:15:40.5	13.5M	5.7	1969787.8	230173.3	29.29993904	-91.4281000	359.5	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM200	4B/1	8/1/96 12:26:15.3- 12:27:43.6	30.0M	88.3	1959847.9	218208.0	29.26618172	-91.4594061	197.5	
RM201	4B/2	8/1/96 13:01:26.0- 13:02:12.5	27.5M	46.5	1959707.3	218049.2	29.26654044	-91.4592768	50.4	
RM202	4B/3	8/1/96 12:41:42.3- 12:42:03.2	19.0M	20.9	1959876.3	218487.3	29.26693184	-91.4591667	181.8	
RM203	4B/3	8/1/96 12:42:37.8- 12:42:40.6	22.5+	2.8	1959969.8	218039.4	29.26570321	-91.4589333	188.2	
RM204	4B/4	8/1/96 12:34:43.8- 12:34:49.8	18.0D	6.0	1959979.5	218311.3	29.26644935	-91.4588833	186.0	
RM205	4B/4	8/1/96 12:35:00.2- 12:35:33.1	26.0M	32.9	1959953.7	218046.6	29.26572324	-91.4588577	175.2	
RM206	4B/5	8/1/96 12:50:34.6- 12:52:10.6	30.0M	85.4	1960039.3	218214.2	29.26618120	-91.4586667	183.1	
RM207	4B/6	8/1/96 13:09:27.7- 13:09:50.2	23.5M	22.5	1960064.0	218487.9	29.26693398	-91.4585748	181.5	
RM208	4B/7	8/1/96 13:17:53.2- 13:18:00.3	423.0-	7.1	1960140.8	218513.4	29.26700739	-91.4584000	188.3	
RM209	4B/8	8/1/96 18:43:46.0- 18:43:50.4	16.5-	4.4	1960189.6	217781.2	29.26583535	-91.4582000	355.1	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM210	4B/8	8/1/96 18:44:21.7- 18:44:38.1	19.5M	16.4	1960160.8	218214.0	29.26702500	-91.4582479	1.3	
RM211	4B/9	8/1/96 13:25:06.4- 13:25:10.8	16+	4.4	1960201.8	218549.3	29.26710312	-91.4581485	182.1	
RM212	4B/9	8/1/96 13:25:26.2- 13:26:03.5	27.5M	37.3	1960211.0	218256.2	29.26630078	-91.4580500	175.0	
RM213	4B/10	8/1/96 12:37:57.5- 12:38:14.0	22.5M	16.5	1960256.2	217792.1	29.26599804	-91.4579167	7.6	
RM214	4B/11	8/1/96 13:22:15.6- 13:22:20.2	18.0D	4.6	1960335.5	218062.5	29.26674083	-91.4577914	355.0	
RM215	4B/12	8/1/96 12:47:40.7- 12:47:48.5	47.0M	7.8	1960383.5	218217.2	29.26716997	-91.4575667	2.7	
RM216	4B/12	8/1/96 12:48:01.6- 12:48:04.9	15.0+	3.3	1960420.0	218386.1	29.26759115	-91.4576911	337.5	
RM217	4B/13	8/1/96 13:05:33.4- 13:07:05.1	11.5M	91.7	1960406.1	218023.9	29.26663849	-91.4575094	1.2	
RM218	4B/15	8/1/96 12:56:06.2- 12:56:18.3	18.5M	12.1	1960571.0	217671.6	29.26566841	-91.4570333	356.9	
RM219	5A/1	8/4/96 14:22:53.9- 14:23:16.4	80.0M	22.5	1974023.6	239180.2	29.32401201	-91.4149127	187.2	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM220	5A/2	8/4/96 14:29:50.7- 14:29:54.0	63.0+	3.3	1974120.8	239236.4	29.32417116	-91.4145333	190.9	
RM221	5A/3	8/4/96 14:36:43.3- 14:36:48.2	50.5D	4.9	1974152.7	239111.1	29.32382376	-91.4145167	188.6	
RM222	5A/4	8/4/96 14:42:45.0- 14:42:50.8	135-	5.8	1974197.8	239720.5	29.32549583	-91.4143500	184.8	
RM223	5A/5	8/4/96 14:50:08.8- 14:50:12.1	12.5+	3.3	1974169.6	239200.0	29.3246966	-91.4143015	165.4	
RM224	5A/6	8/4/96 14:56:03.3- 14:56:30.2	32.0M	26.9	1974284.1	239734.3	29.32553190	-91.4140500	180.6	
RM225	5A/6	8/4/96 14:57:07.4- 14:57:21.2	47.5M	13.8	1974279.9	239256.3	29.32422051	-91.4141000	186.0	
RM226	5A/7	8/4/96 14:59:41.9- 15:00:04.4	27.0M	22.5	1974288.0	239355.4	29.32519213	-91.4139333	9.3	
RM227	5A/8	8/4/96 14:19:23.8- 14:19:28.1	44.0D	4.3	1974350.7	239288.7	29.32501330	-91.4137667	5.0	
RM228	5A/8	8/4/96 14:19:39.1- 14:19:52.2	108.0M	13.1	1974359.1	239429.2	29.32539137	-91.4136918	12.0	
RM229	5A/8	8/4/96 14:20:07.6- 14:20:10.4	47.0-	2.8	1974400.9	239647.0	29.32598900	-91.4137686	342.3	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM230	5A/9	8/4/96 14:25:43.8- 14:25:46.3	44.5-	2.5	1974411.5	239243.2	29.32488910	-91.4135833	3.9	
RM231	5A/9	8/4/96 14:25:54.2- 14:25:56.8	122.5+	2.6	1974421.1	239337.9	29.32515052	-91.4135667	2.0	
RM232	5A/9	8/4/96 14:26:14.9- 14:26:19.3	58.5+	4.4	1974429.1	239523.8	29.32566283	-91.4135833	356.2	RB24
RM233	5A/10	8/4/96 14:32:19.4- 14:32:22.7	102.5-	3.3	1974450.6	239167.6	29.32467965	-91.4134457	6.0	
RM234	5A/10	8/4/96 14:32:45.2- 14:32:48.0	50.5+	2.8	1974476.8	239378.8	29.32526348	-91.4134500	353.8	
RM235	5A/10	8/4/96 14:32:52.4- 14:32:55.7	24.5-	3.3	1974462.8	239442.1	29.32543799	-91.4134500	0.0	
RM236	5A/11	8/4/96 14:39:10.4- 14:39:13.7	9.5+	3.3	1974533.2	239018.4	29.32427035	-91.4132957	350.5	
RM237	5A/11	8/4/96 14:39:42.2- 14:39:46.6	9.5+	4.4	1974501.8	239290.8	29.32501807	-91.4132833	6.3	
RM238	5A/12	8/4/96 14:45:37.8- 14:45:40.5	14.5-	2.7	1974567.0	239036.5	29.32432096	-91.4131833	351.4	
RM239	5A/12	8/4/96 14:45:46.6- 14:45:51.0	8.5+	4.4	1974531.3	239113.3	29.32452682	-91.4131699	9.2	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM240	5A/13	8/4/96 14:52:36.3- 14:52:42.4	10.0D	6.1	1974640.1	239022.4	29.32428437	-91.4129005	358.9	
RM241	5A/13	8/4/96 14:52:58.4- 14:53:03.3	9.5D	4.9	1974633.9	239205.3	29.32475785	-91.4130915	334.1	
RM242	5A/13	8/4/96 14:53:48.3- 14:53:51.1	17.0-	2.8	1974639.7	239577.7	29.32580179	-91.4130062	344.2	
RM243	5B/1	8/4/96 16:43:05.6- 16:43:11.6	14.5+	6.0	1978945.7	244913.0	29.33978975	-91.3995000	190.4	
RM244	5B/1	8/4/96 16:43:21.1- 16:43:23.8	18.0+	2.7	1978894.4	244804.9	29.33948900	-91.3995000	167.5	
RM245	5B/2	8/4/96 16:35:59.8- 16:36:11.8	13.0M	12.0	1978964.4	245038.9	29.34012767	-91.3993333	175.0	
RM246	5B/3	8/4/96 16:30:14.8- 16:30:23.6	26.0D	8.8	1979033.8	244962.9	29.33992103	-91.3991833	184.6	
RM247	5B/5	8/4/96 16:18:20.8- 16:18:25.2	25.0D	4.4	1979126.8	244519.1	29.33869811	-91.3988491	178.7	
RM248	5B/5	8/4/96 16:18:28.5- 16:18:31.2	91.5-	2.7	1979114.7	244462.2	29.33854583	-91.3988167	168.8	
RM249	5B/6	8/4/96 16:11:14.4- 16:11:25.4	44.5M	11.0	1979183.5	245039.3	29.34012992	-91.3986989	182.5	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM250	5B/7	8/4/96 16:05:56.8- 16:06:07.2	770.0M	10.4	1979252.5	244505.9	29.33866732	-91.3985167	187.6	
RM251	5B/8	8/4/96 16:40:01.2- 16:40:08.9	1599.0M	7.7	1979266.3	244564.0	29.33952614	-91.3983302	8.0	
RM252	5B/9	8/4/96 16:33:19.1- 16:33:22.4	138.0+	3.3	1979315.9	244464.2	29.33925742	-91.3982475	357.6	
RM253	5B/9	8/4/96 16:33:30.1- 16:33:41.7	207.0M	11.6	1979321.1	244589.7	29.33960166	-91.3982006	6.5	
RM254	5B/10	8/4/96 16:27:31.1- 16:27:37.3	49.0M	6.2	1979348.3	244594.4	29.33960622	-91.3980535	10.8	
RM255	5B/11	8/4/96 16:20:22.2- 16:20:30.9	128.5D	8.7	1979390.8	244384.3	29.33903132	-91.3979343	8.7	
RM256	5B/11	8/4/96 16:20:56.8- 16:20:59.5	248.5+	2.7	1979502.0	244636.2	29.33971868	-91.3977687	342.6	
RM257	5B/12	8/4/96 16:14:32.5- 16:14:41.9	534.5M	9.4	1979470.2	244487.7	29.33932181	-91.3977833	354.8	
RM258	5B/12	8/4/96 16:15:34.1- 16:15:40.1	21.0D	6.0	1979495.0	245012.8	29.34073535	-91.3978520	333.4	
RM259	5C/1	8/4/96 13:17:32.7- 13:17:37.1	17.5D	4.4	1971391.0	235275.1	29.31327438	-91.4232000	192.5	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM260	5C/2	8/4/96 13:25:19.1- 13:25:24.0	11.0-	4.9	1971372.4	235112.0	29.31281570	-91.4231941	183.3	
RM261	5C/2	8/4/96 13:25:47.8- 13:25:53.6	9.0M	5.8	1971390.7	234858.2	29.31212051	-91.4231598	186.6	
RM262	5C/2	8/4/96 13:26:05.7- 13:26:15.1	11.0M	9.4	1971367.6	234665.8	29.31158802	-91.4232000	182.1	RA12
RM263	5C/3	8/4/96 13:32:05.8- 13:32:11.8	15.0D	6.0	1971462.4	235247.4	29.31319056	-91.4229333	186.3	
RM264	5C/3	8/4/96 13:32:19.5- 13:32:48.1	12.5M	28.6	1971422.5	235041.5	29.31262018	-91.4230000	178.1	
RM265	5C/5	8/4/96 13:46:04.4- 13:46:13.8	61.5D	9.4	1971537.0	234966.4	29.31242048	-91.4227154	188.7	
RM266	5C/6	8/4/96 13:21:31.3- 13:21:34.6	12.0-	3.3	1971546.4	234727.0	29.31246507	-91.4226333	353.9	
RM267	5C/6	8/4/96 13:21:39.0- 13:21:43.4	22.0D	4.4	1971525.3	234788.4	29.31262809	-91.4225962	8.6	
RM268	5C/6	8/4/96 13:21:55.4- 13:22:03.1	50.0D	7.7	1971583.6	234946.9	29.31307038	-91.4225000	356.3	
RM269	5C/7	8/4/96 13:52:10.6- 13:52:29.8	14.0M	19.2	1971642.2	235207.8	29.31307986	-91.4223500	183.6	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM270	5C/7	8/4/96 13:52:58.3- 13:53:15.3	9.5M	17.0	1971623.1	234823.1	29.31202116	-91.4223978	182.0	
RM271	5C/12	8/4/96 13:55:19.6- 13:55:46.4	18.5M	26.8	1971851.2	234598.3	29.31211123	-91.4216167	2.4	
RM272	5C/12	8/4/96 13:56:07.3- 13:56:12.2	8.0D	4.9	1971859.5	234902.8	29.31294980	-91.4216333	356.5	
RM273	5C/13	8/4/96 13:49:26.8- 13:49:30.1	13.0-	3.3	1971964.6	234744.5	29.31251420	-91.4213167	354.6	
RM274	5C/13	8/4/96 13:49:50.9- 13:49:58.5	308.5M	7.6	1971899.1	234972.0	29.31313981	-91.4214833	0.1	
RM275	5D/2	8/4/96 17:05:25.3- 17:05:28.1	28.5+	2.8	1979991.0	244989.9	29.33999551	-91.3961667	182.8	
RM276	5D/3	8/4/96 17:10:53.7- 17:11:26.6	21.0M	32.9	1980049.1	245263.7	29.34075000	-91.3960000	185.0	
RM277	5D/3	8/4/96 17:11:37.1- 17:12:04.1	25.5M	27.0	1980017.1	244986.9	29.33999243	-91.3959697	166.5	
RM278	5D/4	8/4/96 17:19:25.0- 17:19:29.4	167.5-	4.4	1980147.9	245417.9	29.43119056	-91.3957698	196.6	
RM279	5D/5	8/4/96 17:26:20.9- 17:27:37.1	32.5M	76.2	1980152.1	245139.3	29.34040714	-91.3956667	183.6	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM280	5D/6	8/4/96 17:31:58.2- 17:32:07.0	18.0D	8.8	1980195.6	245481.9	29.34134953	-91.3955333	183.9	
RM281	5D/6	8/4/96 17:33:17.7- 17:33:25.6	13.5M	11.7	1980219.0	244849.5	29.33960964	-91.3954500	182.7	
RM282	5D/8	8/4/96 17:01:03.9- 17:01:08.3	16.0-	4.4	1980305.6	244804.9	29.34019304	-91.3951921	350.5	
RM283	5D/8	8/4/96 17:01:23.7- 17:01:30.8	16.5D	7.1	1980263.0	244984.4	29.34068748	-91.3952333	3.6	
RM284	5D/10	8/4/96 17:14:26.6- 17:14:29.9	16.0+	3.3	1980352.2	245123.3	29.34106471	-91.3949167	8.9	
RM285	5D/11	8/4/96 17:22:44.9- 17:22:47.6	18.0+	2.7	1980451.8	244689.0	29.33987484	-91.3947305	350.8	
RM286	5D/11	8/4/96 17:23:40.2- 17:24:05.5	22.0M	25.3	1980432.1	245322.1	29.34161815	-91.3947333	359.4	
RM287	5D/12	8/4/96 17:29:28.3- 17:29:32.7	32.5+	4.4	1980487.0	244922.0	29.34049881	-91.3947052	338.5	
RM288	5D/12	8/4/96 17:29:49.1- 17:29:52.4	31.0+	3.3	1980424.9	245090.1	29.34097497	-91.3946972	7.7	
RM289	5D/13	8/4/96 17:35:51.0- 17:35:55.4	13.5+	4.4	1980553.9	245028.1	29.34080866	-91.3944000	352.4	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM290	5E/1	8/4/96 15:19:07.4- 15:19:10.2	23.5+	2.8	1979743.2	243518.8	29.33595046	-91.3969500	184.0	
RM291	5E/1	8/4/96 15:29:40.4- 15:19:44.9	18.0D	4.5	1979705.2	243221.2	29.33513008	-91.3970434	180.4	
RM292	5E/2	8/4/96 15:24:50.9- 15:25:05.7	25.5M	14.8	1979775.1	243684.6	29.33640436	-91.3968167	179.2	
RM293	5E/2	8/4/96 15:25:46.3- 15:26:13.2	28.5M	26.9	1979755.4	243144.1	29.33491891	-91.3968333	173.0	
RM294	5E/3	8/4/96 15:32:07.2- 15:32:15.1	27.5+	7.9	1979834.9	243235.5	29.33517350	-91.3966799	186.6	
RM295	5E/4	8/4/96 15:39:31.4- 15:39:41.8	18.5M	10.4	1979840.2	243680.5	29.33640215	-91.3965094	164.6	
RM296	5E/4	8/4/96 15:40:18.1- 15:40:45.0	29.0M	26.9	1979906.5	243220.2	29.33514102	-91.3965030	193.5	
RM297	5E/5	8/4/96 15:46:31.3- 15:46:36.1	145.5+	4.8	1979955.4	243381.9	29.33557611	-91.3963000	186.3	
RM298	5E/6	8/4/96 15:52:40.6- 15:52:45.0	320.5+	4.4	1979992.3	243363.6	29.3353145	-91.3962167	191.0	
RM299	5E/6	8/4/96 15:52:57.1- 15:53:04.3	745.0+	7.2	1979938.0	243229.5	29.33515275	-91.3962898	177.2	

ANOM. #	AREA/ LINE	DATE/ TIME	GAMMA/ SIGNATURE	DURATION (seconds)	X (NAD 1927)	Y (NAD 1927)	LATITUDE	LONGITUDE	HEADING	CORRELATIONS
RM300	5E/7	8/4/96 15:16:27.0- 15:16:46.2	36.0D	19.2	1980018.6	243237.7	29.33588483	-91.3960667	353.8	
RM301	5E/7	8/4/96 15:16:52.3- 15:16:55.6	2817.5+	3.3	1979990.0	243378.1	29.33627142	-91.3961127	0.0	
RM302	5E/8	8/4/96 15:22:33.1- 15:22:40.2	595.0D	7.1	1980094.8	243369.8	29.3623545	-91.3959118	341.7	
RM303	5E/9	8/4/96 15:28:01.6- 15:28:04.3	692.5-	2.7	1980113.5	242084.7	29.33518812	-91.3957000	3.5	
RM304	5E/9	8/4/96 15:28:43.2- 15:28:49.2	2661.0	6.0	1980111.8	243358.2	29.33621619	-91.3957167	2.0	
RM305	5E/10	8/4/96 15:35:02.7- 15:35:22.5	41.0	19.8	1980143.1	243357.1	29.33620951	-91.3955833	7.0	
RM306	5E/12	8/4/96 15:49:01.5- 15:49:15.2	18.0M	13.7	1980269.6	243125.9	29.33557415	-91.3953167	348.4	
RM307	5E/12	8/4/96 15:49:50.9- 15:49:58.6	14.5D	7.7	1980226.3	243497.6	29.33659284	-91.3953036	9.7	

APPENDIX VIII

RESUMES OF KEY PROJECT PERSONNEL

R. CHRISTOPHER GOODWIN, Ph.D.
PRESIDENT & CEO

Dr. R. Christopher Goodwin, is President and Director of Research of R. Christopher Goodwin & Associates, Inc., a preservation planning and research and compliance firm with offices in Frederick, Maryland, New Orleans, Louisiana, Tallahassee, Florida, and Seattle, Washington. A native of Maryland, he is a former Yale Peabody Museum Research Associate (1976), Arizona State University Fellow, and Smithsonian Institution (1979-1980) Research Fellow and Scholar-in-Residence. Dr. Goodwin holds degrees in Anthropology/Archeology from Tulane (B.A.), Florida State (M.S.), and Arizona State (Ph.D) Universities; the latter institution named him a "College of Liberal Arts Leader," in 1997.

Dr. Goodwin is recognized as one of the nation's leading experts in cultural resource management. He has been a contractor to the U.S. Army Corps of Engineers (Baltimore, Memphis, Nashville, New Orleans, Pittsburgh, Savannah, St. Louis, and Vicksburg Districts), to the Naval Facilities Engineering Command, and to the Department of Defense on numerous projects. During the past 16 years, he has served as Principal Investigator for major cultural resource investigations conducted by his firm in the Mid-Atlantic, Southeastern, Western, and Caribbean Regions. These projects have included such large-scale efforts as the architectural and archeological investigations at Baltimore's Oriole Park at Camden Yards stadium site; the new Baltimore Ravens Stadium; and the Washington Redskins' Jack Kent Cooke Stadium.

Dr. Goodwin's expertise also has been called upon for historic preservation planning projects, and for industrial and governmental agency compliance with federal and state laws and regulations governing archeological and historic sites. He has served as Principal Investigator on preservation and compliance projects for the National Capital, Southeast, and Southwest regions of the National Park Service (NPS); the Department of Energy (DOE); Her Majesty's Service, U.K.; the Louisiana Division of Archaeology; major utility companies, including Allegheny Power, ENRON, Texaco, Southern Natural Gas (SONAT), ANR/Coastal, Baltimore Gas and Electric Company, and Peabody Coal; the U.S. Fish and Wildlife Service, Northeast Region; the City of Annapolis; and, the Maryland Historical Trust. The geographic range of research and compliance projects completed under Goodwin's direction encompasses the Leeward Islands, Puerto Rico, the Bay Islands of Honduras, Maryland, Virginia, West Virginia, Pennsylvania, Ohio, Illinois, Arkansas, Florida, Georgia, Louisiana, Mississippi, California, and Texas.

Dr. Goodwin has published widely in the fields of prehistoric and historic archeology, and ethnohistory. His areas of particular expertise include preservation planning, cultural resource management, cultural ecology, prehistoric demography, field methods in archeology, human osteology, and historic archeology. He is a court-qualified expert in both historic archeology and in cultural resource management. In 1992, he was a recipient of the National Trust for Historic Preservation's National Preservation Honor Award for his work at Maryland's oldest surviving historic building, the Third Haven Meeting House, and of the Anne Arundel County Trust for Historic Preservation's Achievement in Archeology Award in 1992 and 1993. In 1997, he received the United States Small Business Administration's Administrators Award of Excellence, for "Outstanding Contribution and Service to the Nation," and the Maryland Historical Trust's Educational Excellence Award.

In addition to numerous technical reports and monographs, Dr. Goodwin has contributed to numerous scholarly journals, including *American Anthropologist*, *American Antiquity*, the *Florida Anthropologist*, and *American Scientist*. Dr. Goodwin is listed in *Who's Who in Leading American Executives* and *Who's Who Among Outstanding Americans*.

JOHN L. SEIDEL, PH.D.
ASSISTANT VICE PRESIDENT

Dr. John L. Seidel, Assistant Vice President - Nautical Archeological Services, received his baccalaureate degree from Drew University in 1976, and his graduate degrees from the University of Pennsylvania: M.A.s in Anthropology and American Civilization in 1980 and 1981, respectively, and a Ph.D. in Historical Archaeology in 1987. Dr. Seidel has taught archaeology at both Rutgers University and the University of Maryland, College Park, including field schools in underwater and terrestrial archeology and courses in historic preservation and cultural resource management.

Dr. Seidel has directed research at a variety of Revolutionary War sites, including the Continental Artillery Cantonment of 1778-1779 in Pluckemin, New Jersey, at various brigade sites and the Fort Nonsense section of Morristown National Historical Park, New Jersey, on privately owned sections of the New Windsor Cantonment in New York, and at several domestic structures of the period, including Washington's Headquarters in Somerville, New Jersey. He has served as a consultant to various other projects on military sites, has chaired symposia on the subject, and lectured widely on the archeology of the American Revolution.

As Associate Director of the University of Maryland's Archaeology in Annapolis program, Dr. Seidel designed and supervised several Department of Defense Legacy grants on the U.S. Naval Academy (including terrestrial and underwater surveys). His most recent work includes development of a computer-based Geographic Information System (GIS) for management of the city's architectural and archeological resources. During his tenure at the University of Maryland, Dr. Seidel collaborated with the Submerged Cultural Resource Unit of the National Park Service on a survey in the Dry Tortugas and a detailed investigation of the wreck of *HMS Fowey* (1748) in Biscayne National Park. In another collaborative effort, he co-directed investigations at the Steward Shipyard for the Maryland Historical Trust and the Archaeological Society of Maryland.

Since joining R. Christopher Goodwin & Associates, Inc., in September of 1995, Dr. Seidel has managed a Phase II investigation of the wreck of the Civil War steamship *Kentucky* on the Red River, Louisiana, has directed large remote sensing surveys in the Gulf of Mexico, the Atlantic, and the Chesapeake Bay for the U.S. Army Corps of Engineers, the U.S. Navy, and private clients, and has prepared a cultural resource management plan for the United States Naval Academy. He recently served as Principal Investigator for Phase I-III investigations at the Naval Academy which uncovered early Academy features (ca. 1846), the pre-Academy Army installation of Fort Severn (1808-1845), and eighteenth century remains. He is a certified Divemaster with the Professional Association of Diving Instructors (PADI) and holds additional certifications from PADI, the YMCA, and the National Association of Underwater Instructors (NAUI).

DAVID S. ROBINSON
NAUTICAL ARCHEOLOGIST/REMOTE SENSING SPECIALIST

David S. Robinson graduated with honors from the University of Rhode Island in 1990 with a double-major degree in Anthropology and in Art, and will receive a Master of Arts degree in Anthropology from Texas A&M University's Institute of Nautical Archeology (INA) in August 1998. His research interests include maritime history and naval architecture, steamboat technology, conservation, marine remote sensing, and scientific diving technology and policy. Mr. Robinson has extensive formal training and experience in all phases of nautical archeological research, remote sensing, conservation, and diving safety, and has conducted archeological and archival investigations in Delaware, the District of Columbia, Louisiana, Maine, Maryland, Massachusetts, Michigan, New York, Pennsylvania, Ohio, Rhode Island, Texas, Vermont, and Virginia.

As a graduate student at Texas A&M University, Mr. Robinson worked with Dr. George F. Bass as an INA Graduate Research Assistant, and participated in INA's archeological studies of Byzantine and Bronze Age shipwrecks, Port Royal, Jamaica, and a Revolutionary War site and several nineteenth century shipwrecks on Lake Champlain. Before joining Goodwin & Associates, Inc., Mr. Robinson served as an archeological consultant and chief conservator for the Lake Champlain Maritime Museum at Basin Harbor, Vermont. From 1991-93, Mr. Robinson also worked with the Smithsonian Institution as Assistant Field Director and Principal Ship Reconstructor on the *Indiana* Project. This project is the topic of Mr. Robinson's master's thesis.

Since joining Goodwin & Associates, Inc. in 1993, Mr. Robinson has been involved with numerous Phase I, II, and III archeological investigations of both terrestrial and underwater sites, and is the co-designer of Goodwin & Associates' digital surveying system. Most recently, he has been involved with the documentation of a Confederate troop-transport lost on the Red River, near Shreveport, Louisiana. In addition to numerous technical reports and the company's *Diving Safety Manual*, Mr. Robinson is the author of the *Lake Champlain Maritime Museum Conservation Manual*, and has published articles in the *International Journal of Nautical Archaeology and Underwater Exploration*, and the *Institute of Nautical Archaeology Quarterly*. He has presented professional papers at the Conference on Underwater Archeology, the Society of Industrial Archeology's National Conference, the Middle Atlantic Archeological Conference, the National Maritime Center, and the Maritime Archeological Historical Society. Mr. Robinson is a certified scuba diving instructor and is the company's Diving Safety Officer. Mr. Robinson's professional affiliations include: the American Academy of Underwater Sciences, the Divers Alert Network, the Institute of Nautical Archeology, the Maritime and Archeological Historical Society, the Middle Atlantic Archeological Conference, the Professional Association of Diving Instructors, and the Society for Industrial Archeology.

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N185000 —

N184000 —

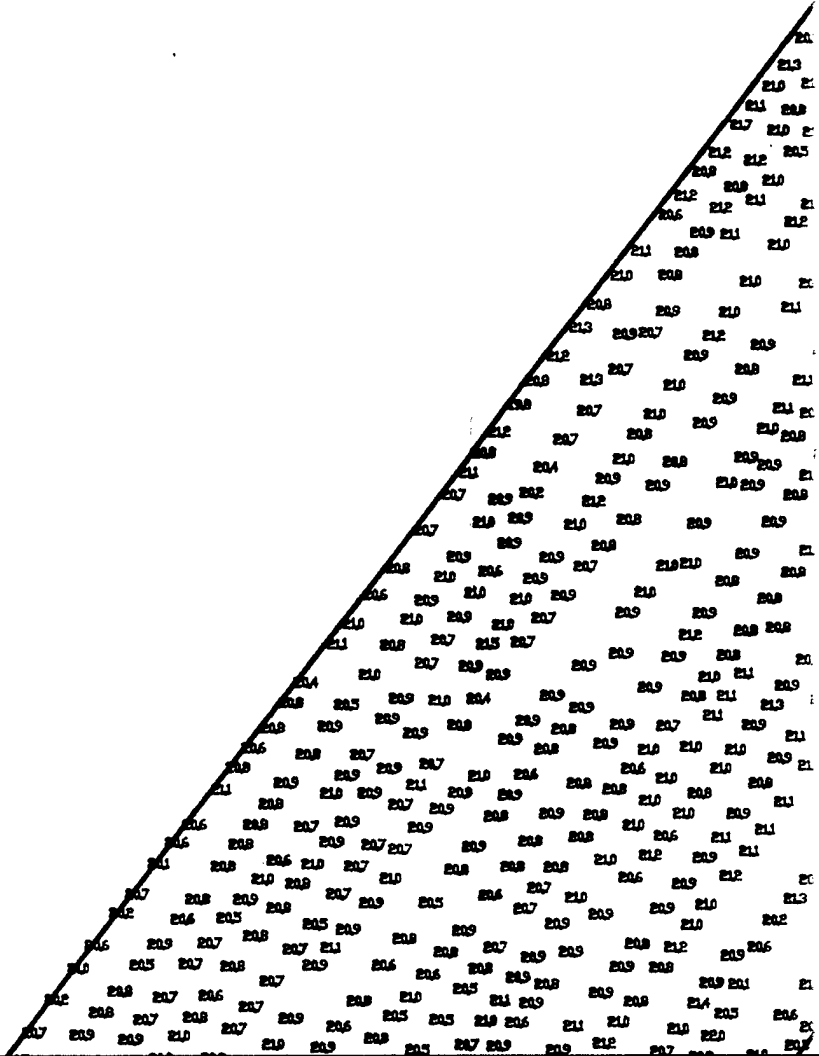
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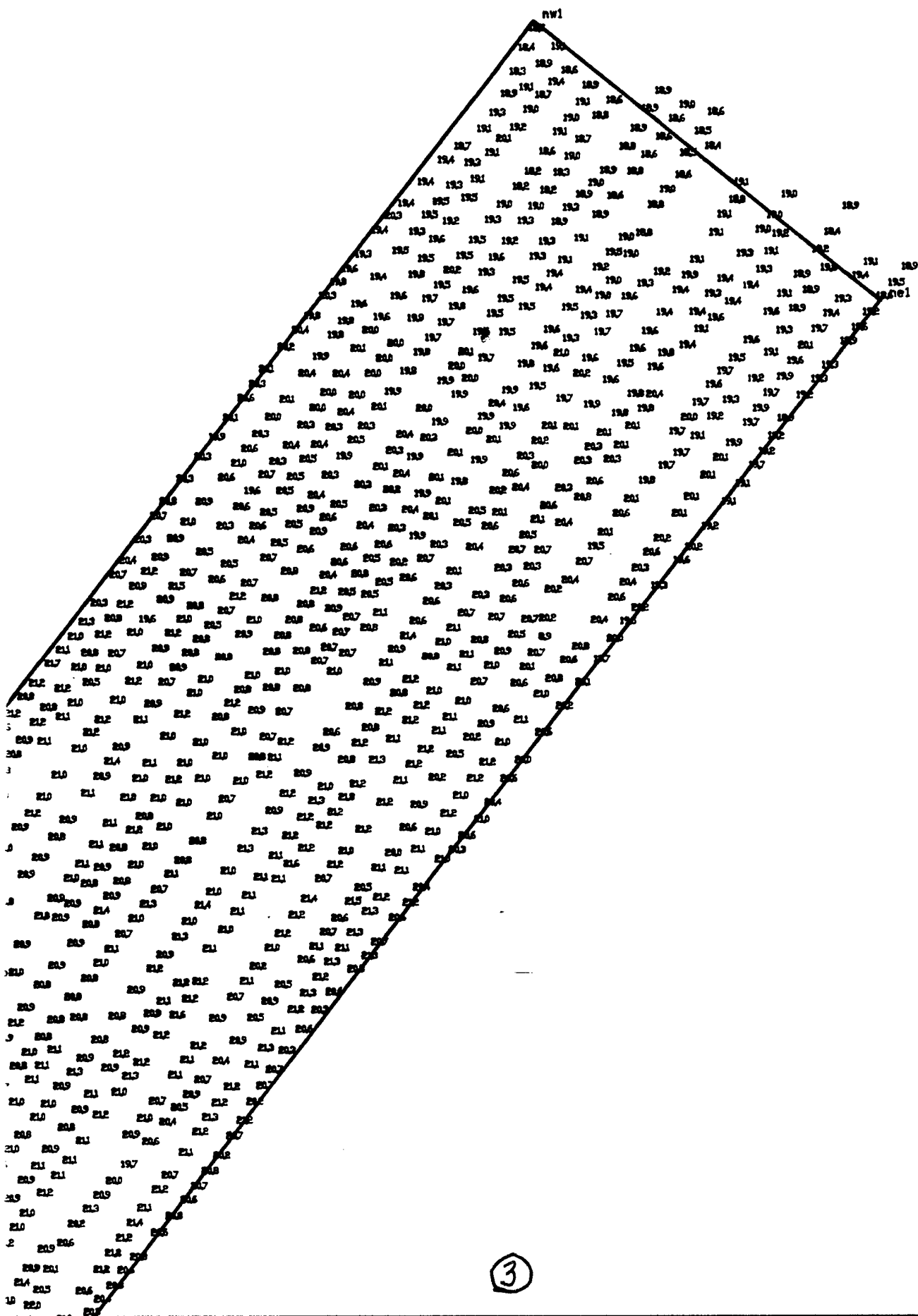
N182000 —

N181000 —

N180000 —

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N180000 —

N179000 —

N178000 —

N177000 —

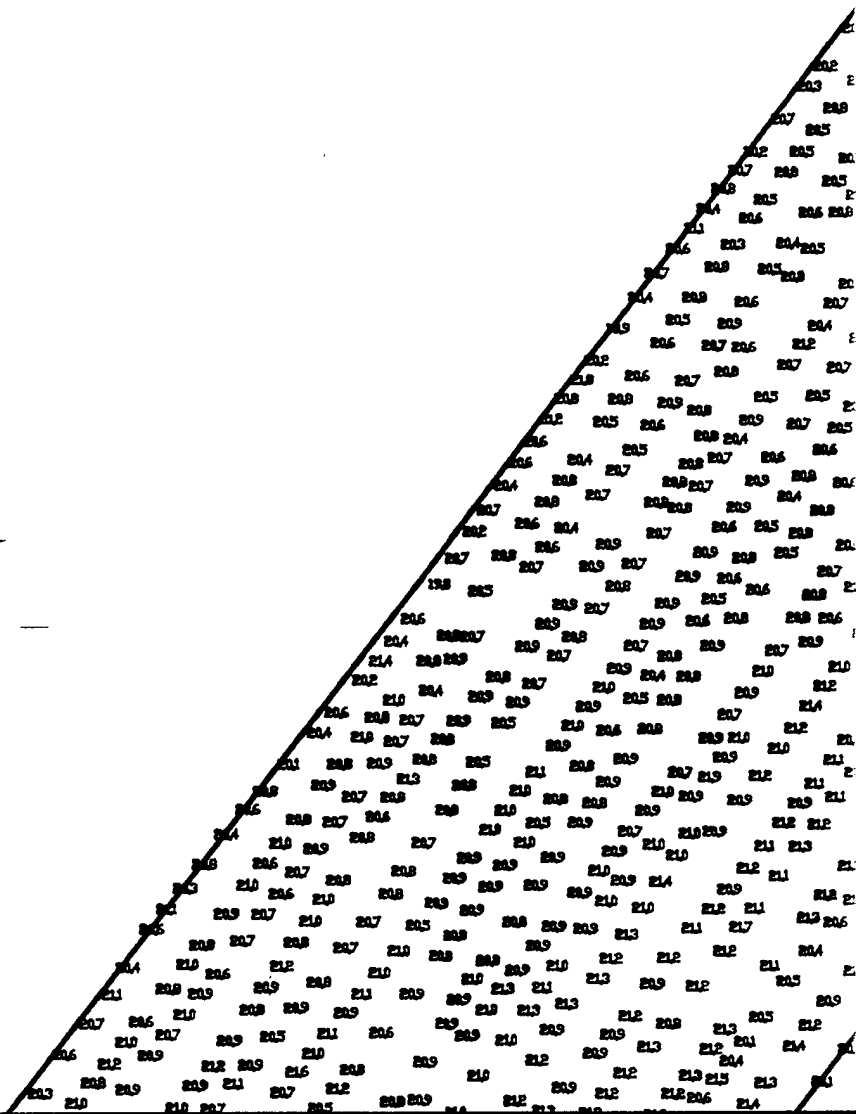
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N175000 —

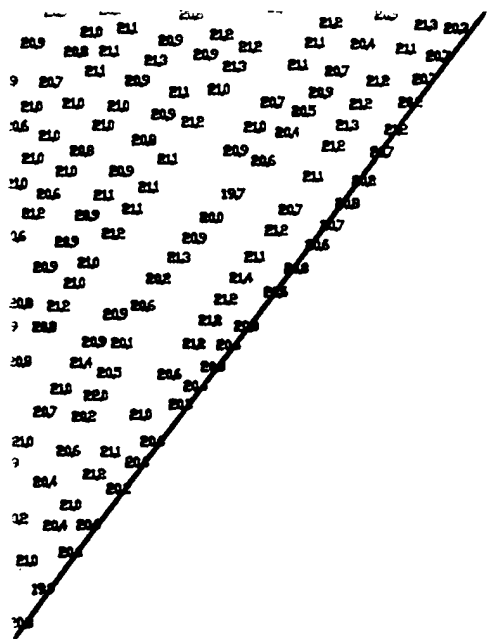
N174000 —

N173000 —

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⑤



SURVEY BLOCK 1

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N173000 —

N172000 —

N171000 —

N170000 —

N169000 —
E1920000

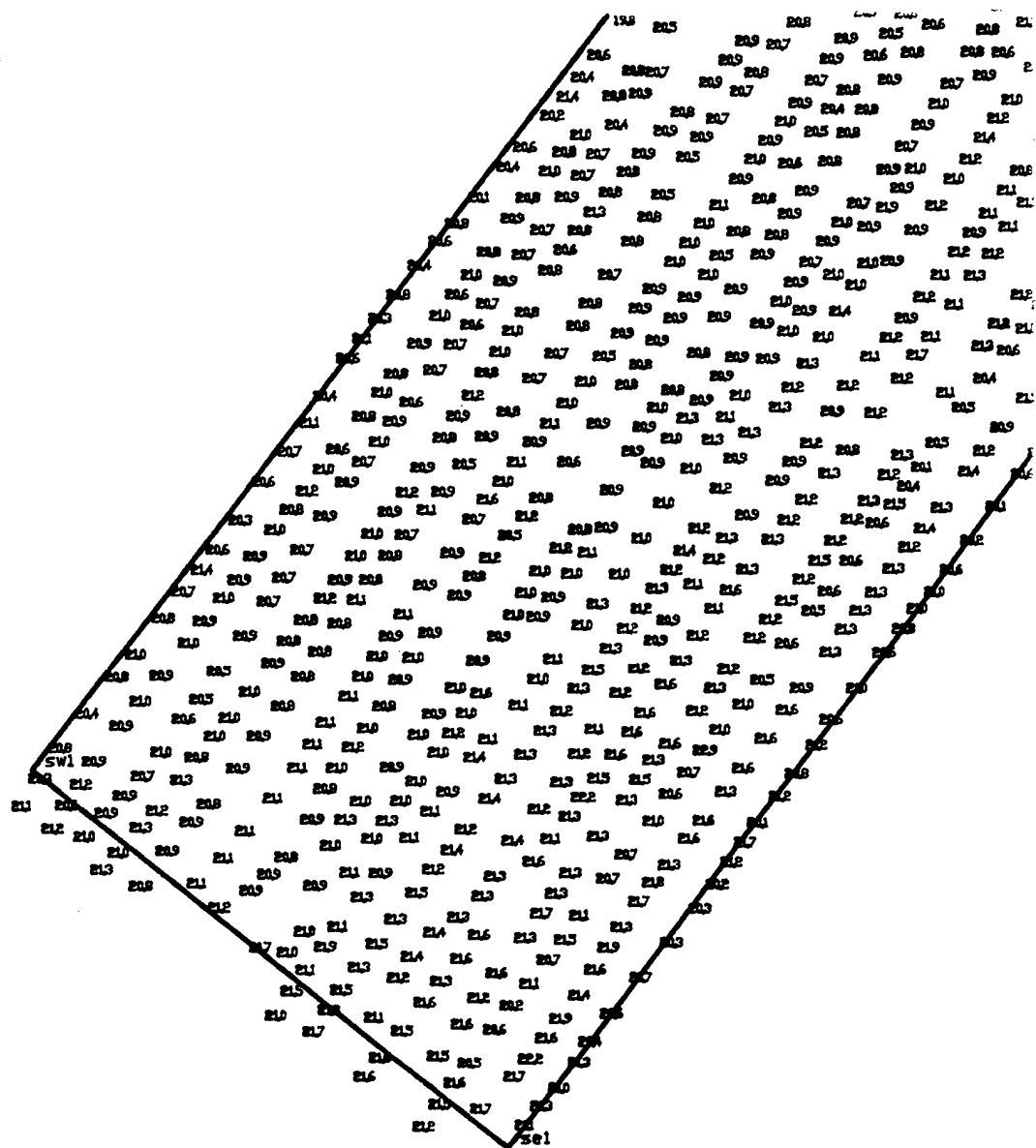
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E1922000

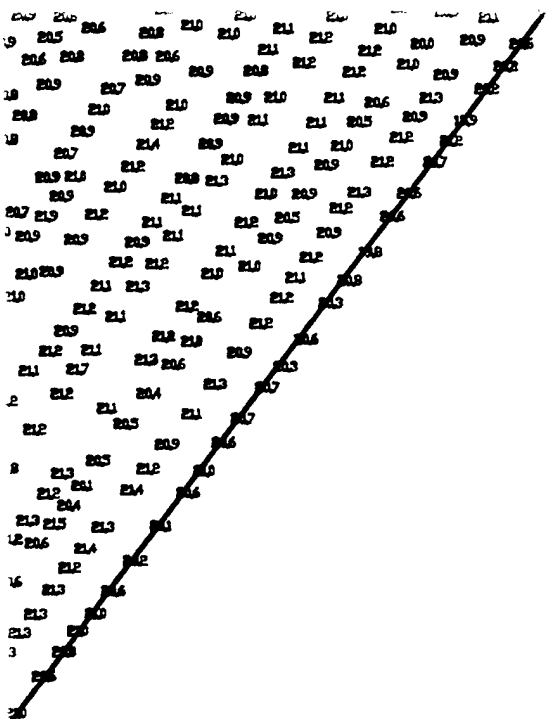
E1923000

E1924000

E1925000



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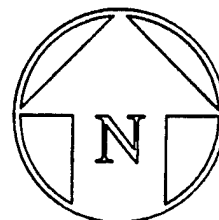
E1925000 E1926000 E1927000 E1928000 E1929000 E1930000 E1931000

NOTES:

- 1). BATHYMETRIC DATA: SAMPLING OF RECORDED DATA PLOTTED AT 100 FT. INTERVAL (APPROXIMATELY 6% OF ALL RECORDED DATA). DEPTHS RECORDED IN FEET.
- 2). DECIMAL POINT IN DEPTH READINGS DENOTES ACTUAL POINT OF SOUNDING.
- 3). COORDINATE SYSTEM BASED UPON LOUISIANA STATE PLANE (SOUTH), USING NORTH AMERICAN DATUM 1927. DATUM TRANSFORMATION USED MEAN CONUS PARAMETERS.
- 4). TIDE CORRECTIONS MADE USING COASTAL OCEANOGRAPHICS HYPACK (VER 6.4) HARMONIC PREDICTION PROGRAM AND TIDE DATA FROM THE 1996 BRITISH ADMIRALTY TIDE TABLES, PUBLISHED BY THE HYDROGRAPHER OF THE ROYAL NAVY.

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SURVEY BLOCK 1



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TELY 6% OF ALL DATUM 1927. IDICTION PROGRAM RAPHER OF THE	 FEET METERS	ATCHAFALAYA O.D.M.D.S. Survey Block 1 Bathymetry	
		DATE: 11/1/96	PREPARED BY: DWG
		R. Christopher Goodwin & Associates, Inc. 5824 PLAUCHE STREET, NEW ORLEANS, LA 70123	

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Figure 12. Bathymetry in Block 1

N202000 —

N210000 —

N200000 —

N199000 —

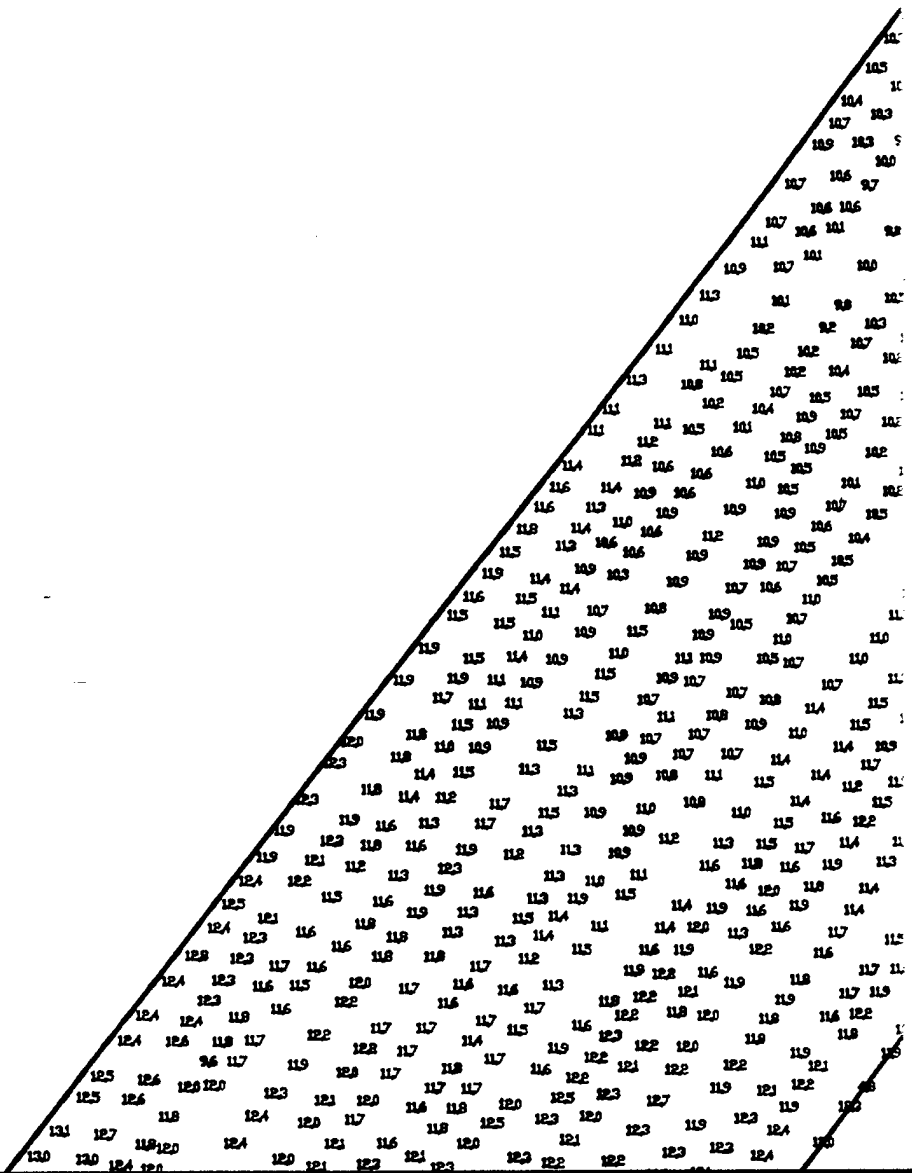
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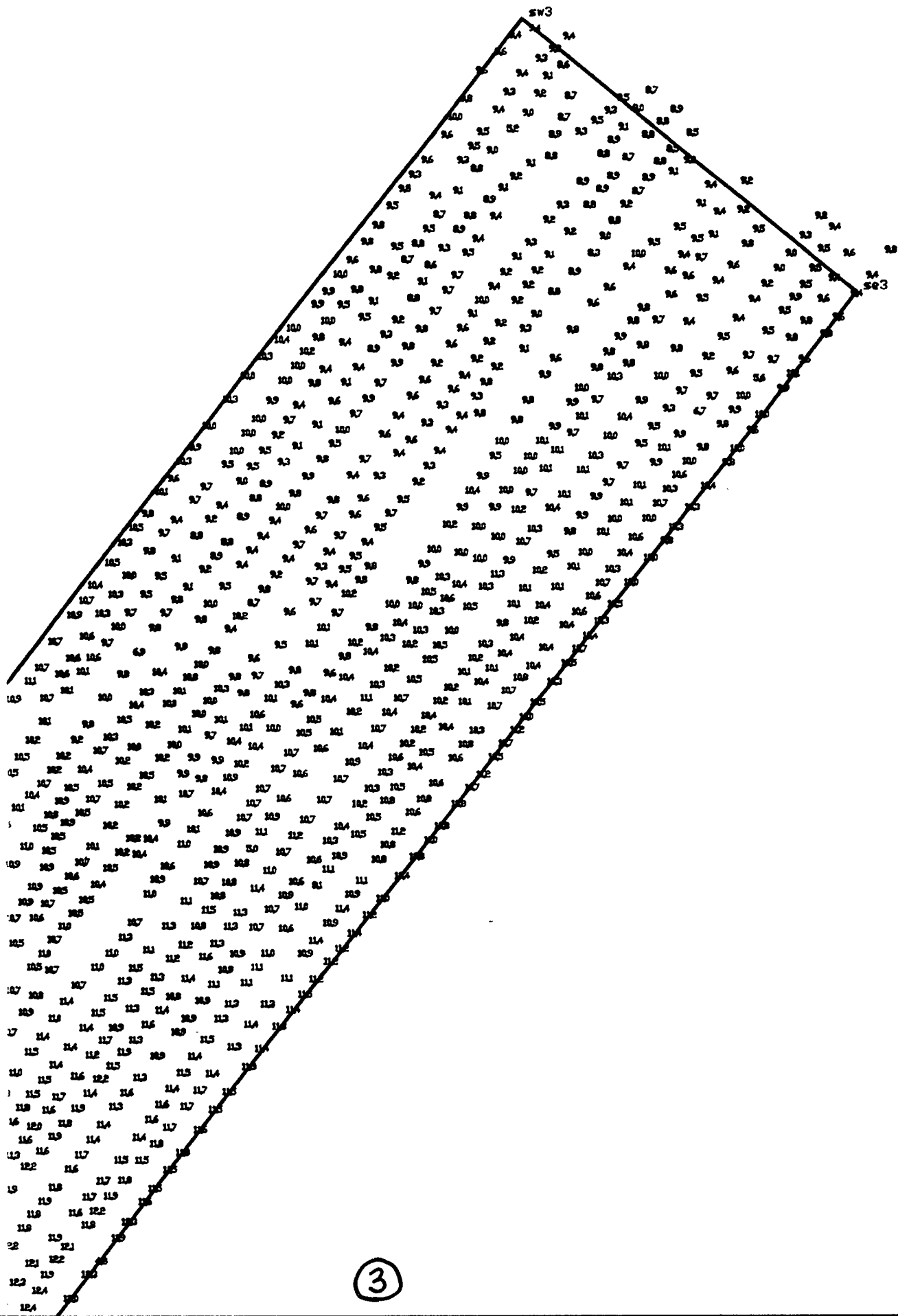
N197000 —

N196000 —

N195000 —

2





N195000 —

N194000 —

N193000 —

N192000 —

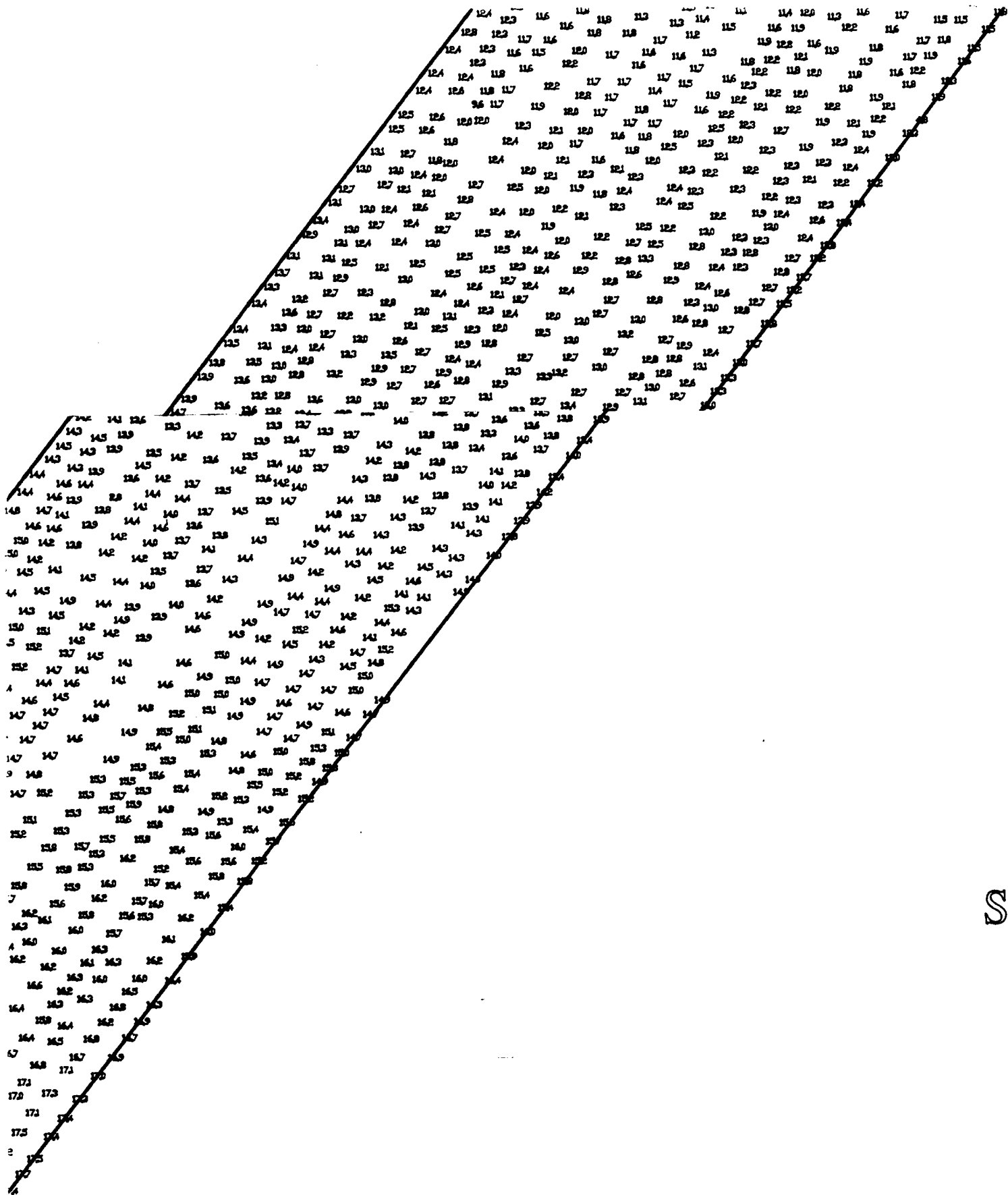
N191000 —

N190000 —

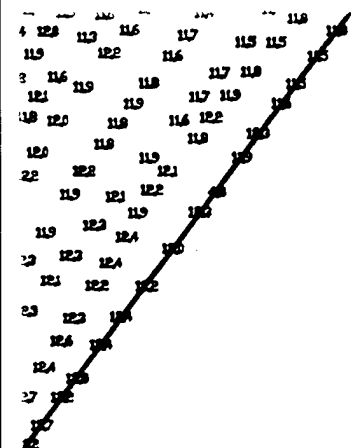
N189000 —

N188000 —

N187000 —



SUI



SURVEY BLOCK 2

N188000 —

N187000 —

N186000 —

N185000 —

N184000 —
E1932000

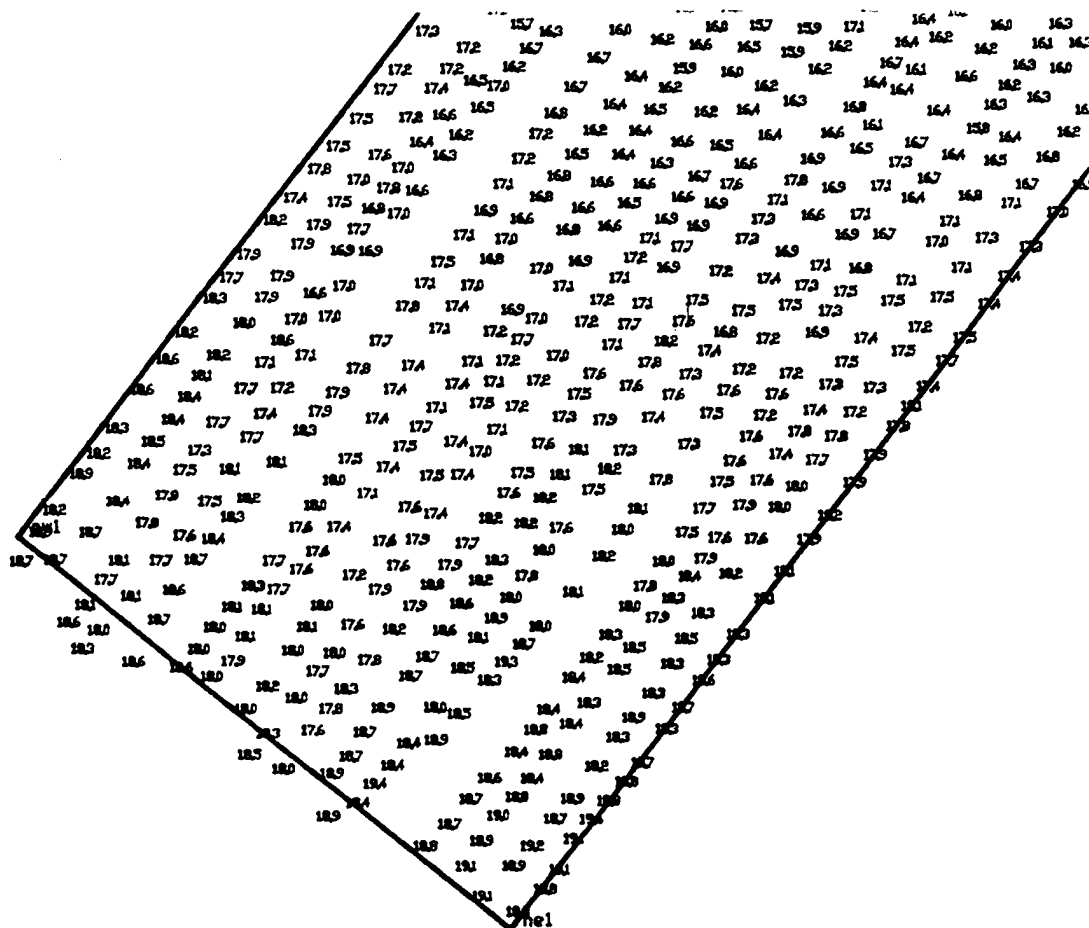
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E1934000

E1935000

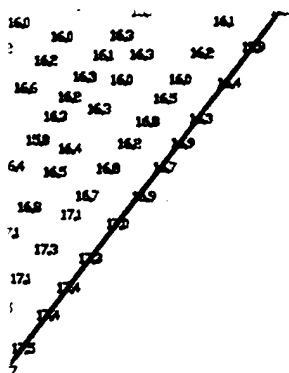
E1936000

E1937000



NOTES:

- 1). BATHYMETRIC RECORD
- 2). DECIMAL
- 3). COORDINATE DATUM
- 4). TIDE CORRECTION AND TIDE ROYAL



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E1938000

E1939000

E1940000

E1941000

E1942000

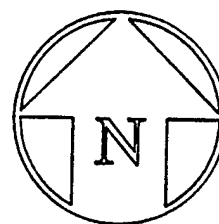
E1943000

NOTES:

- 1). BATHYMETRIC DATA: SAMPLING OF RECORDED DATA PLOTTED AT 100 FT. INTERVAL (APPROXIMATELY 6% OF ALL RECORDED DATA). DEPTHS RECORDED IN FEET.
- 2). DECIMAL POINT IN DEPTH READINGS DENOTES ACTUAL POINT OF SOUNDING.
- 3). COORDINATE SYSTEM BASED UPON LOUISIANA STATE PLANE (SOUTH), USING NORTH AMERICAN DATUM 1927. DATUM TRANSFORMATION USED MEAN CONUS PARAMETERS.
- 4). TIDE CORRECTIONS MADE USING COASTAL OCEANOGRAPHICS HYPACK (VER 6.4) HARMONIC PREDICTION PROGRAM AND TIDE DATA FROM THE 1996 BRITISH ADMIRALTY TIDE TABLES, PUBLISHED BY THE HYDROGRAPHER OF THE ROYAL NAVY.

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E1943000 E1944000 E1945000 E1946000 E1947000

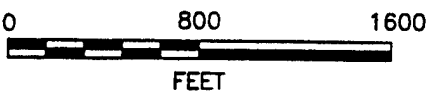
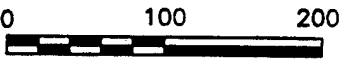

<p>OF ALL</p> <p>1927.</p> <p>PROGRAM</p> <p>OF THE</p>	 <p>0 800 1600</p> <p>FEET</p>  <p>0 100 200</p> <p>METERS</p>	<p>ATCHAFALAYA O.D.M.D.S.</p> <p>Survey Block 2</p> <p>Bathymetry</p> <hr/> <p>DATE: 11/4/96 PREPARED BY: DWG</p> <hr/> <p> R. Christopher Goodwin & Associates, Inc.</p> <p>5824 PLAUCHE STREET, NEW ORLEANS, LA 70123</p>
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Figure 18. Bathymetry in Block 2

N218000 —

N217000 —

N216000 —

N215000 —

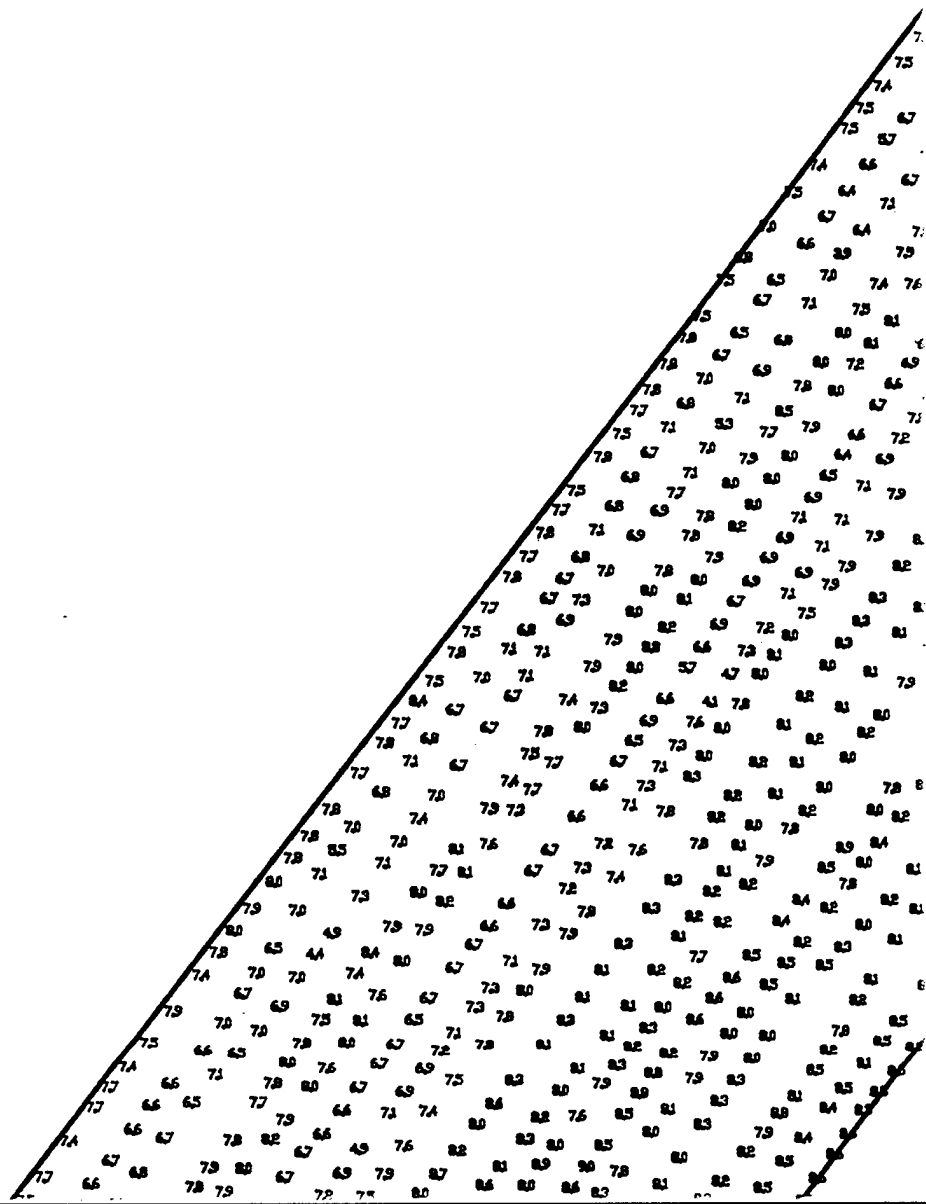
N214000 —

N213000 —

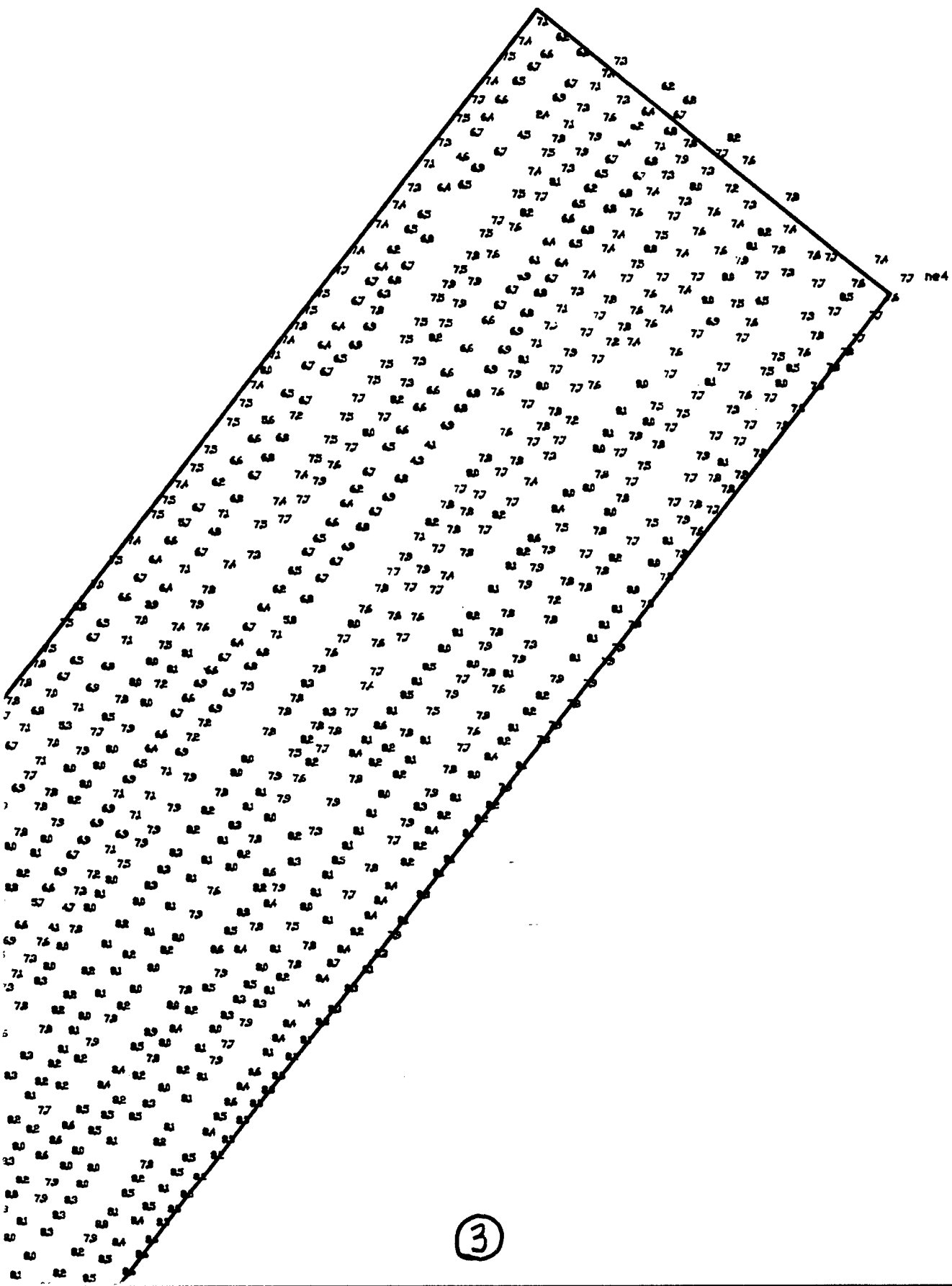
N212000 —

N211000 —

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N211000 —

N210000 —

N209000 —

N208000 —

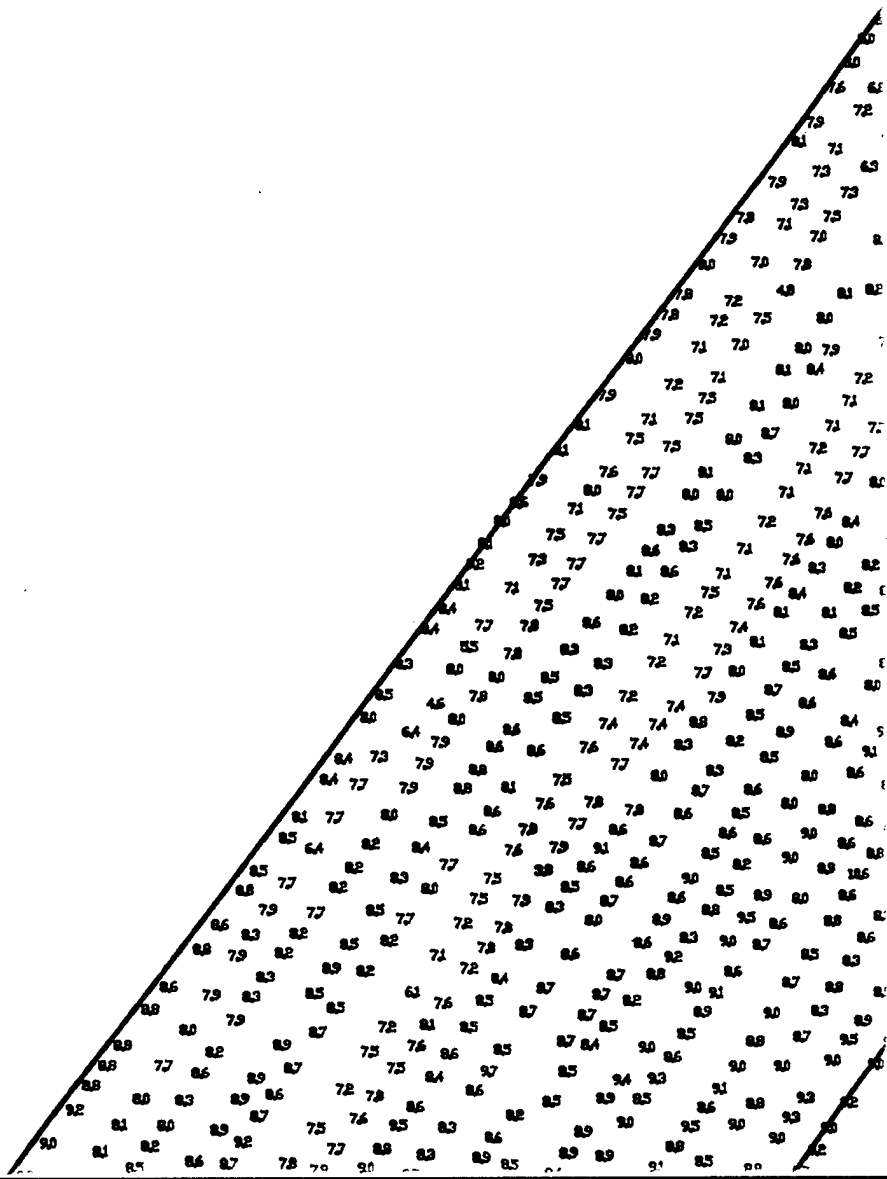
N207000 —

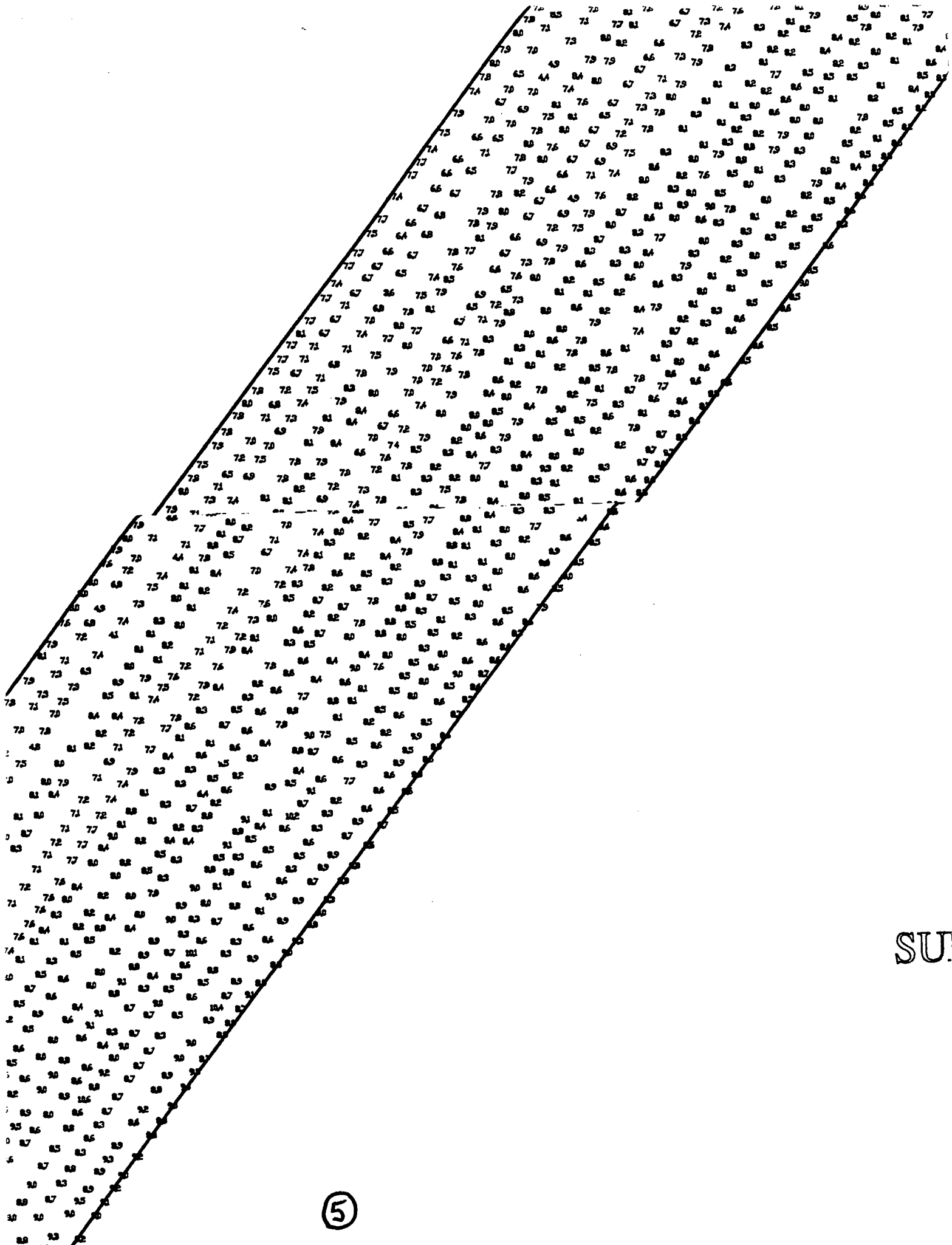
N206000 —

N205000 —

N204000 —

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N204000 —

N203000 —

N202000 —

N201000 —

N200000 —
E1944000

E1945000

E1946000

E1947000

E1948000

E1949000

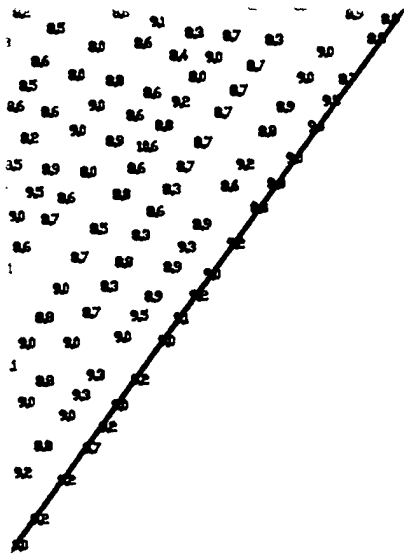
SW3

NE3

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- 1). BA
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- 2). DE
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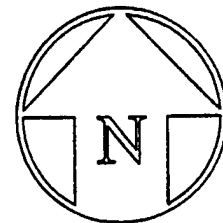
⑦



E1949000 E1950000 E1951000 E1952000 E1953000 E1954000 E1955000

NOTES:

- 1). BATHYMETRIC DATA: SAMPLING OF RECORDED DATA PLOTTED AT 100 FT. INTERVAL (APPROXIMATELY 6% OF ALL RECORDED DATA). DEPTHS RECORDED IN FEET.
- 2). DECIMAL POINT IN DEPTH READINGS DENOTES ACTUAL POINT OF SOUNDING.
- 3). COORDINATE SYSTEM BASED UPON LOUISIANA STATE PLANE (SOUTH), USING NORTH AMERICAN DATUM 1927. DATUM TRANSFORMATION USED MEAN CONUS PARAMETERS.
- 4). TIDE CORRECTIONS MADE USING COASTAL OCEANOGRAPHICS HYPACK (VER 6.4) HARMONIC PREDICTION PROGRAM AND TIDE DATA FROM THE 1996 BRITISH ADMIRALTY TIDE TABLES, PUBLISHED BY THE HYDROGRAPHER OF THE ROYAL NAVY.

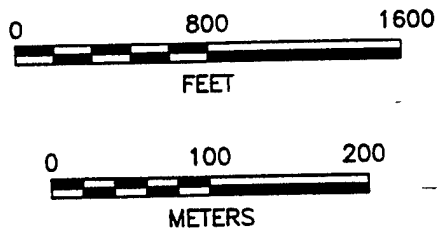


954000 E1955000 E1956000 E1957000 E1958000 E1959000

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IN DATUM 1927.

PREDICTION PROGRAM
OGRAPHER OF THE



ATCHAFALAYA O.D.M.D.S.
Survey Block 3
Bathymetry

DATE: 11/4/96

PREPARED BY: DWG



R. Christopher Goodwin & Associates, Inc.
5824 PLAUCHE STREET, NEW ORLEANS, LA 70123

Figure 23. Bathymetry in Block 3

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N233000 —

N232000 —

N231000 —

N230000 —

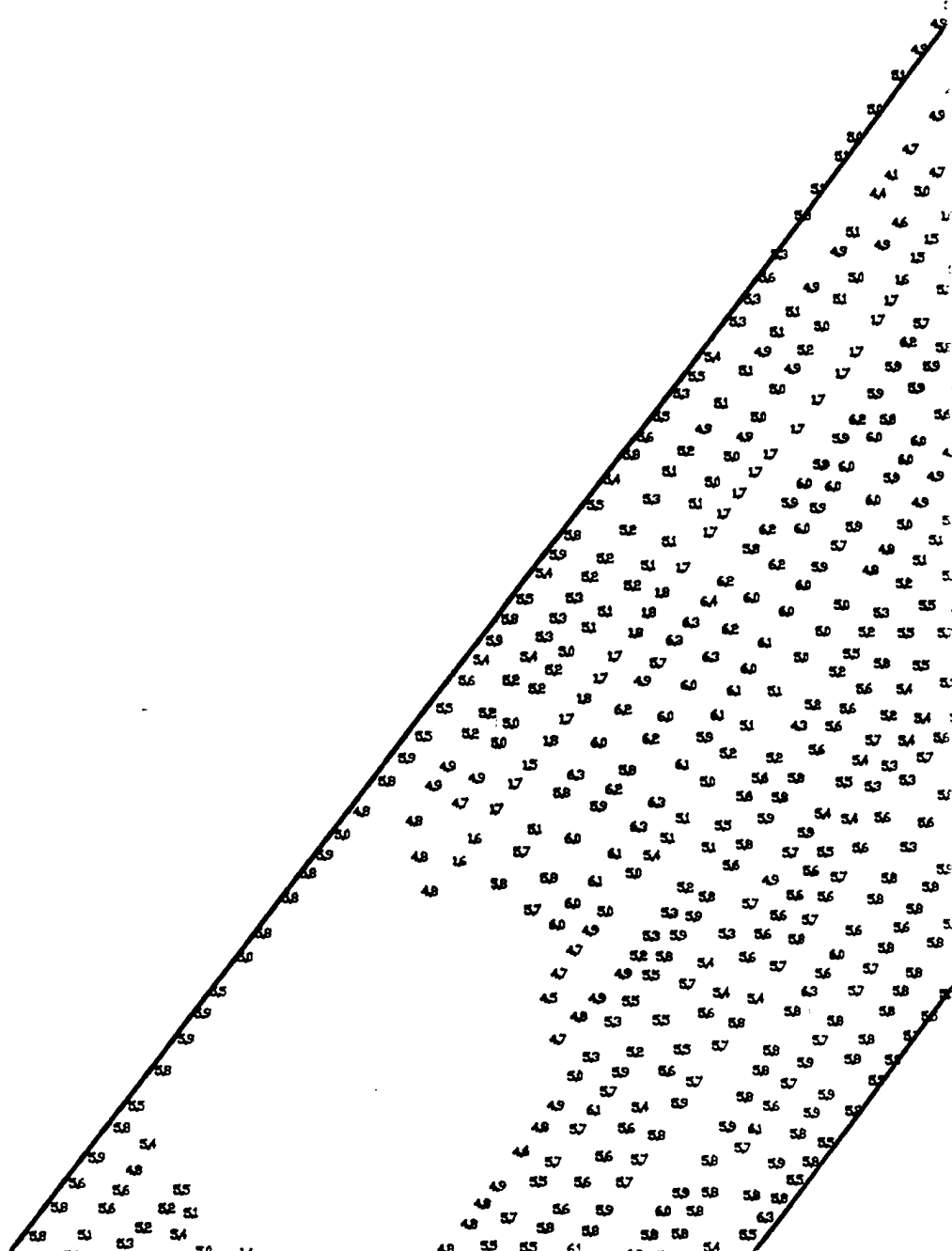
N229000 —

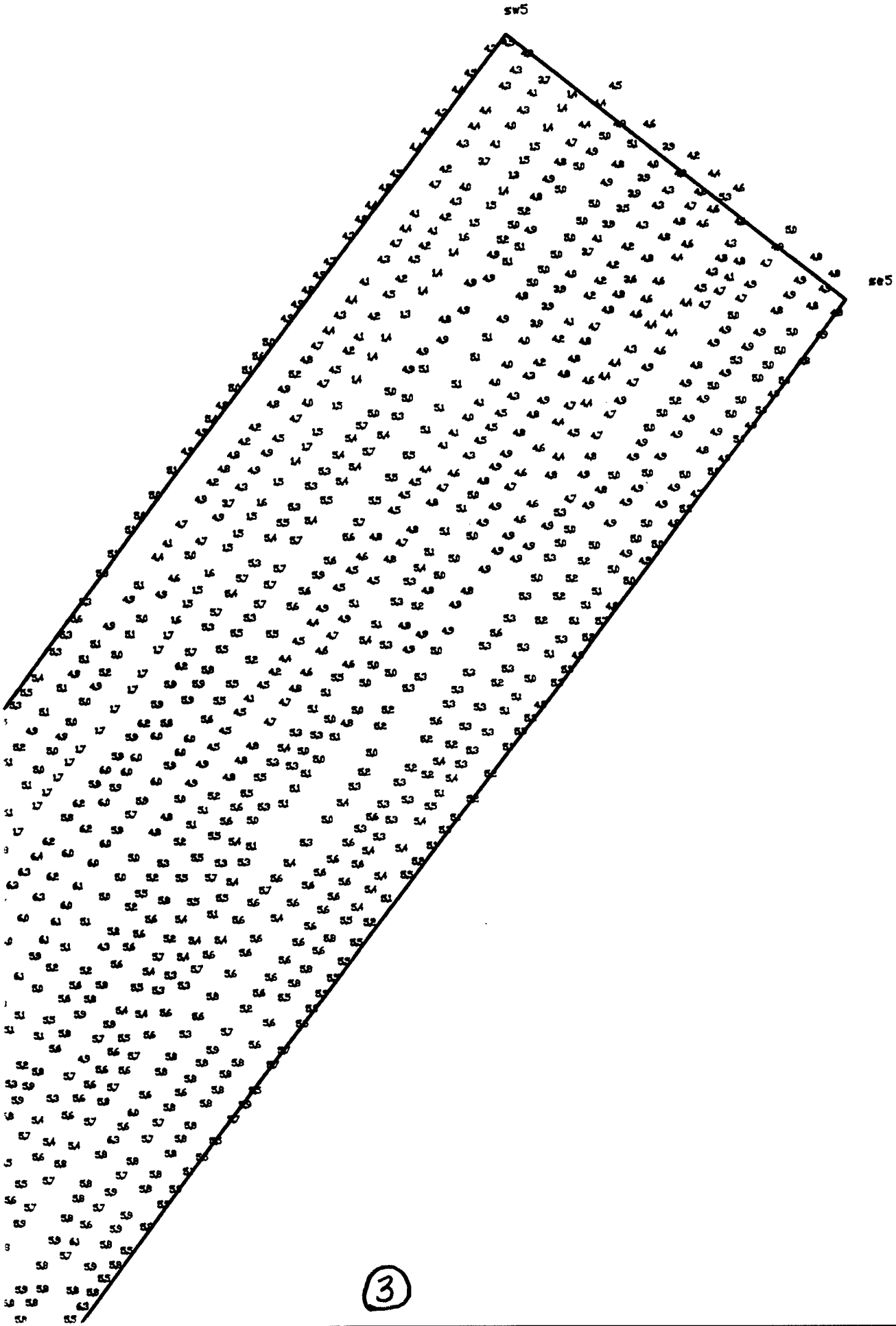
N228000 —

N227000 —

N226000 —

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3

N226000 —

N225000 —

N224000 —

N223000 —

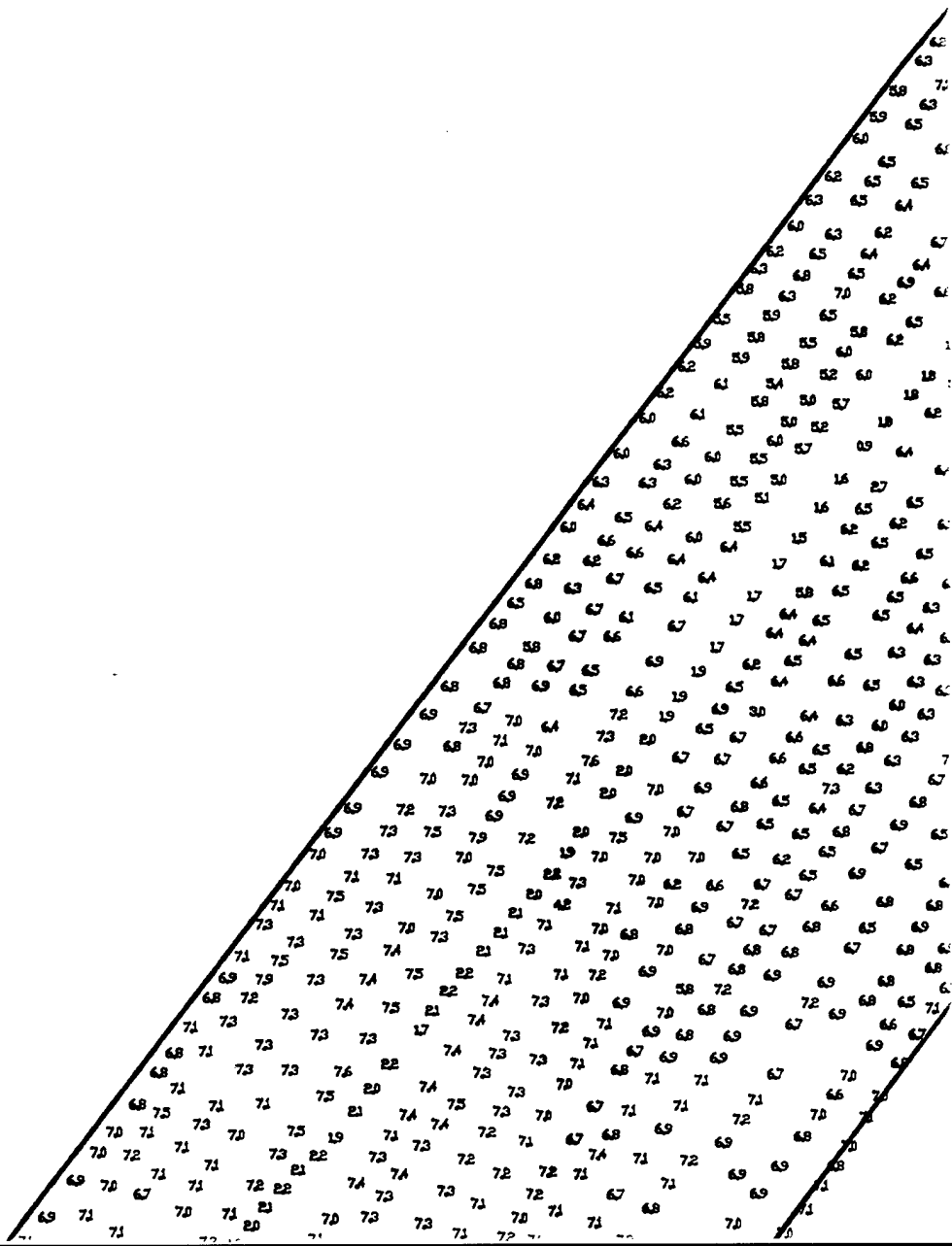
N222000 —

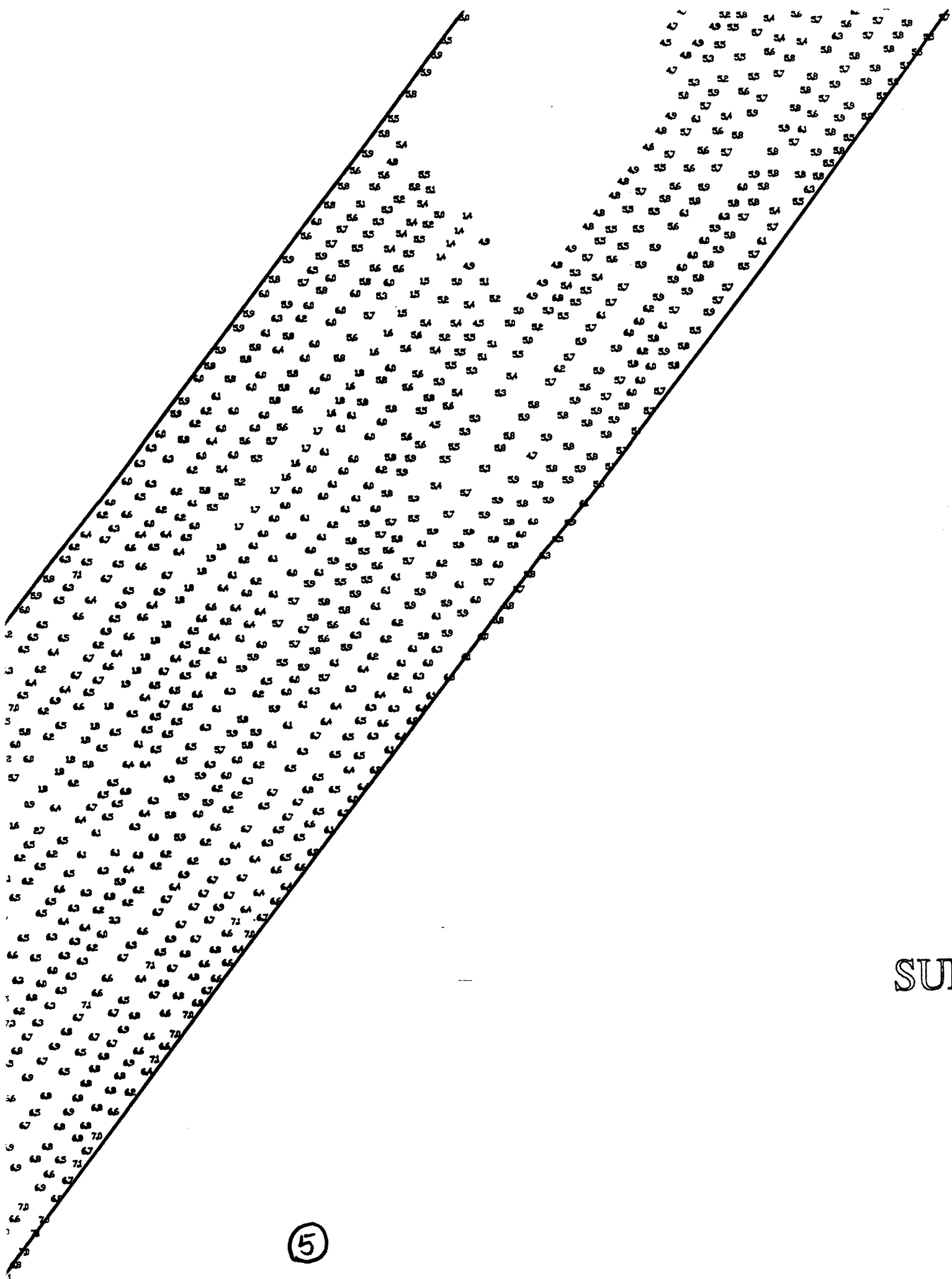
N221000 —

N220000 —

N219000 —

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SURVEY BLOCK 4

N221000 —

N220000 —

N219000 —

N218000 —

N217000 —

N216000 —

N215000 —
E1956000

E1957000

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E1959000

E1960000

E1961000

nw4

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NOTES:

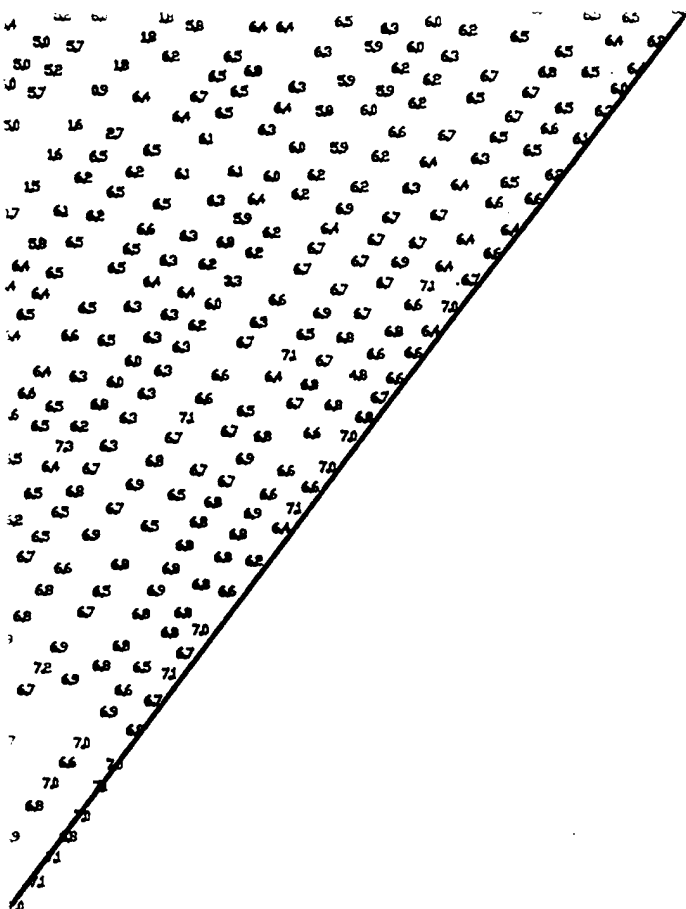
1). BATHY
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3). COORD
DATUM

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E1961000 E1962000 E1963000 E1964000 E1965000 E1966000 E1967000

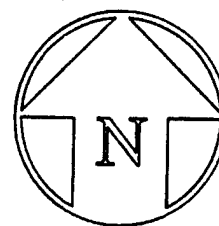
NOTES:

- 1). BATHYMETRIC DATA: SAMPLING OF RECORDED DATA PLOTTED AT 100 FT. INTERVAL (APPROXIMATELY 6% OF ALL RECORDED DATA). DEPTHS RECORDED IN FEET.
- 2). DECIMAL POINT IN DEPTH READINGS DENOTES ACTUAL POINT OF SOUNDING.
- 3). COORDINATE SYSTEM BASED UPON LOUISIANA STATE PLANE (SOUTH), USING NORTH AMERICAN DATUM 1927. DATUM TRANSFORMATION USED MEAN CONUS PARAMETERS.

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SURVEY BLOCK 4



E1967000

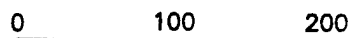
E1968000

E1969000

E1970000

E1971000

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ATCHAFALAYA O.D.M.D.S.

Survey Block 4

Bathymetry

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DATE: 11/4/96

PREPARED BY: DWG

1927.

N219000 —

N218000 —

N217000 —

N216000 —

N215000 —
E1956000

E1957000

E1958000

E1959000

E1960000

E1961000

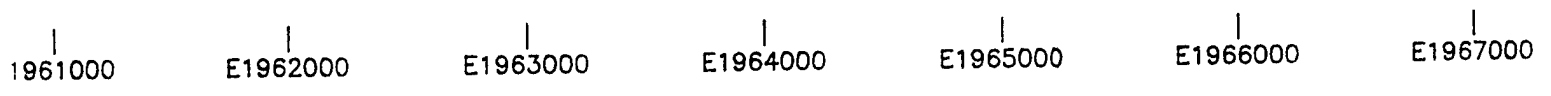
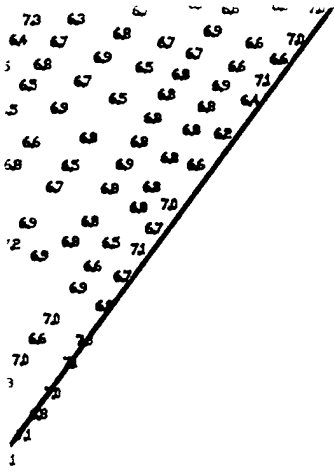
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- 1). BATH
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- 2). DECII
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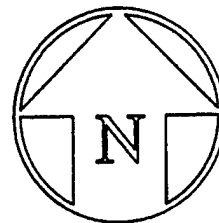
NOTES:

- 1). BATHYMETRIC DATA: SAMPLING OF RECORDED DATA PLOTTED AT 100 FT. INTERVAL (APPROXIMATELY 6% OF ALL RECORDED DATA). DEPTHS RECORDED IN FEET.
- 2). DECIMAL POINT IN DEPTH READINGS DENOTES ACTUAL POINT OF SOUNDING.
- 3). COORDINATE SYSTEM BASED UPON LOUISIANA STATE PLANE (SOUTH), USING NORTH AMERICAN DATUM 1927. DATUM TRANSFORMATION USED MEAN CONUS PARAMETERS.
- 4). TIDE CORRECTIONS MADE USING COASTAL OCEANOGRAPHICS HYPACK (VER 6.4) HARMONIC PREDICTION PROGRAM AND TIDE DATA FROM THE 1996 BRITISH ADMIRALTY TIDE TABLES, PUBLISHED BY THE HYDROGRAPHER OF THE ROYAL NAVY.

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966000 E1967000 E1968000 E1969000 E1970000 E1971000


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		DATE: 11/4/96	PREPARED BY: DWG
		 R. Christopher Goodwin & Associates, Inc. 5824 PLAUCHE STREET, NEW ORLEANS, LA 70123	

Figure 27. Bathymetry in Block 4

N249000 —

N248000 —

N247000 —

N246000 —

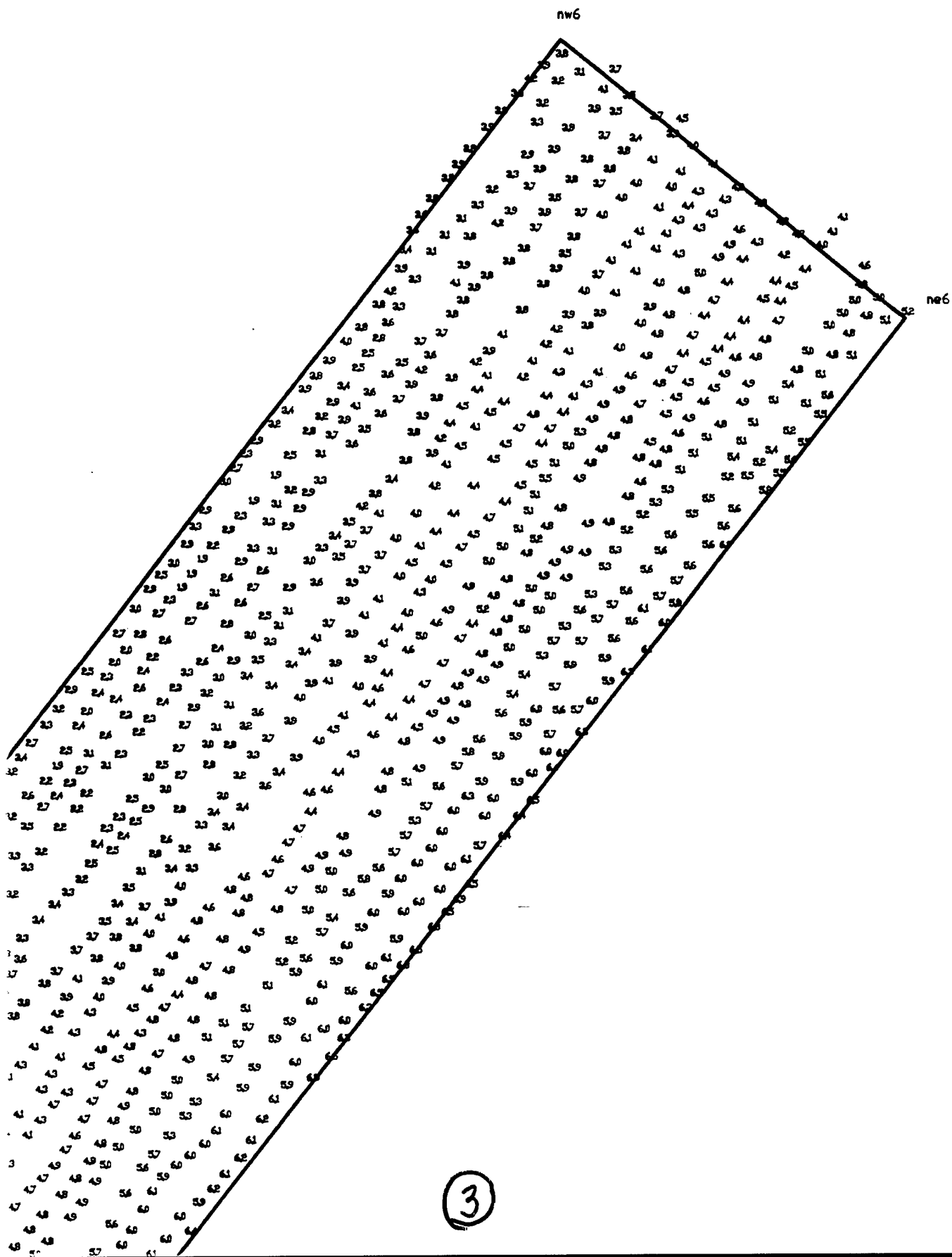
N245000 —

N244000 —

N243000 —

N242000 —

②



N242000 —

N241000 —

N240000 —

N239000 —

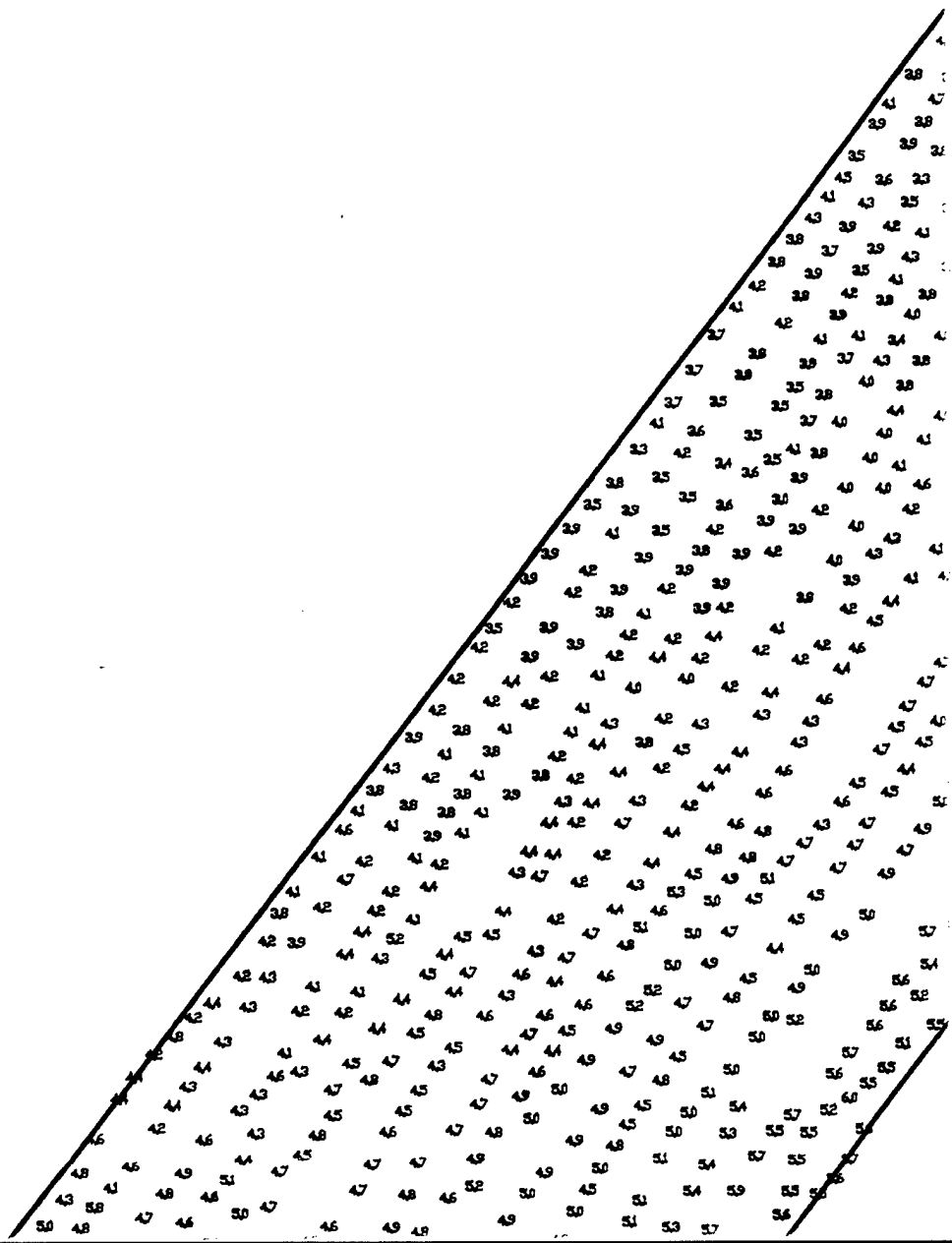
N238000 —

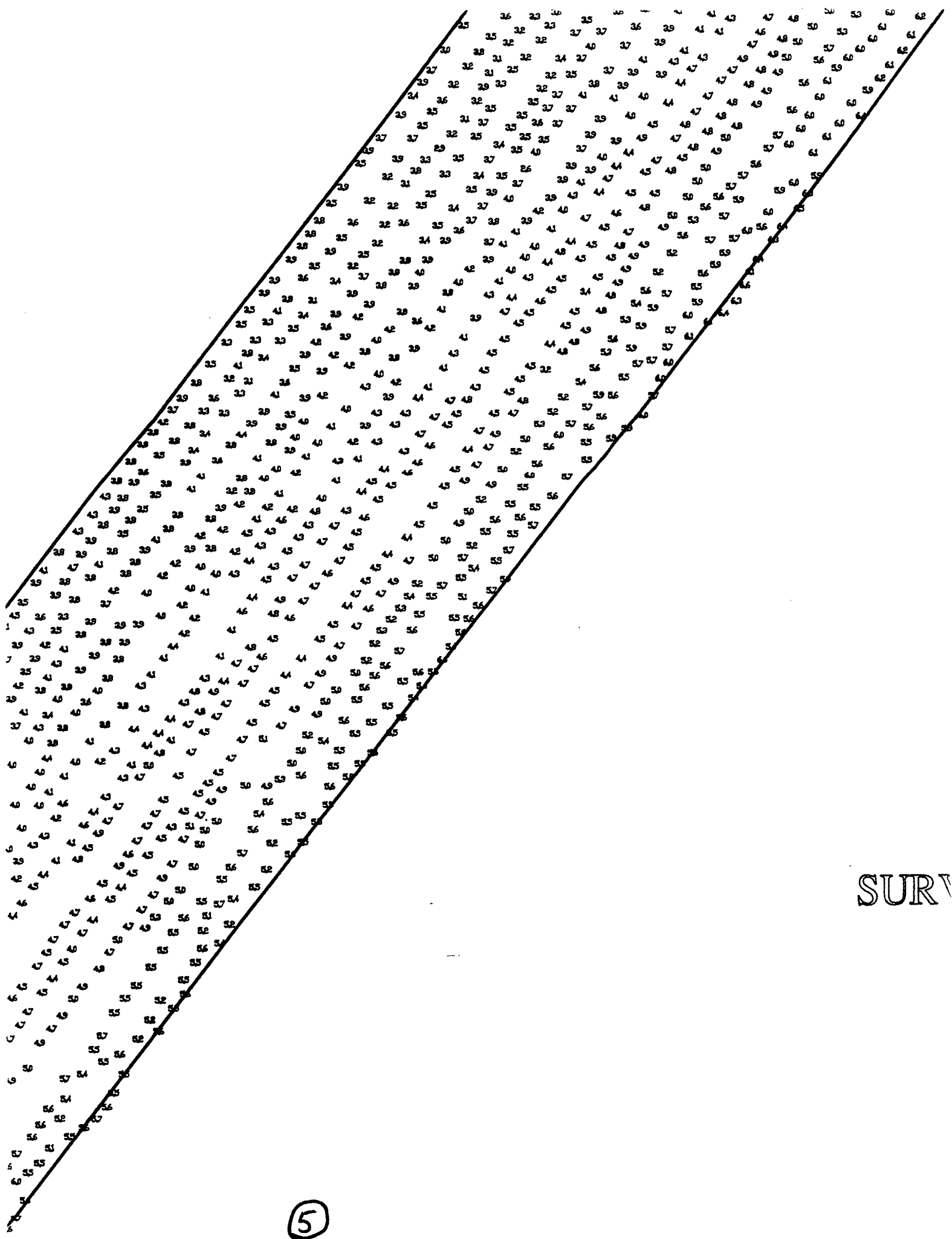
N237000 —

N236000 —

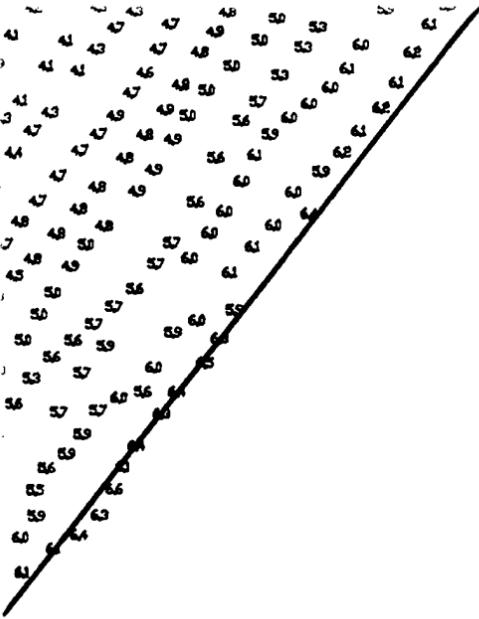
N235000 —

N234000 —





SURV



SURVEY BLOCK 5

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N234000 —

N233000 —

N232000 —

N231000 —
E1968000

E1969000

E1970000

E1971000

E1972000

E1973000

SW5

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NOTES:

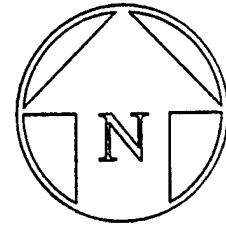
- 1). BATHY
RECORD
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METER
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- 4). TIDE
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7

1973000 E1974000 E1975000 E1976000 E1977000 E1978000 E1979000

NOTES:

- 1). BATHYMETRIC DATA: SAMPLING OF RECORDED DATA PLOTTED AT 100 FT. INTERVAL (APPROXIMATELY 6% OF ALL RECORDED DATA). DEPTHS RECORDED IN FEET.
- 2). DECIMAL POINT IN DEPTH READINGS DENOTES ACTUAL POINT OF SOUNDING.
- 3). COORDINATE SYSTEM BASED UPON LOUISIANA STATE PLANE (SOUTH), USING NORTH AMERICAN DATUM 1927. DATUM TRANSFORMATION USED: MEAN CONUS PARAMETERS.
- 4). TIDE CORRECTIONS MADE USING COASTAL OCEANOGRAPHICS HYPACK (VER 6.4) HARMONIC PREDICTION PROGRAM AND TIDE DATA FROM THE 1996 BRITISH ADMIRALTY TIDE TABLES, PUBLISHED BY THE HYDROGRAPHER OF THE ROYAL NAVY.

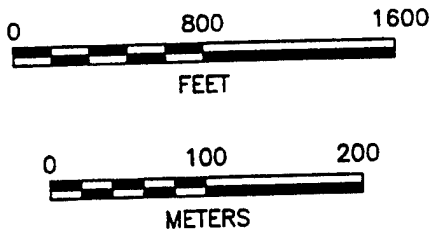


178000 E1979000 E1980000 E1981000 E1982000 E1983000

ATELY 6% OF ALL

N DATUM 1927.

REDICTION PROGRAM
OGRAPHER OF THE



ATCHAFALAYA O.D.M.D.S.
Survey Block 5
Bathymetry

DATE: 11/4/96

PREPARED BY: DWG



R. Christopher Goodwin & Associates, Inc.
5824 PLAUCHE STREET, NEW ORLEANS, LA 70123

Figure 31. Bathymetry in Block 5